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PANTOLOGIA.

VOL. XI.

SPA — TZE.

London: Printed by T. Davison,
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PANTOLOGIA.

A

NEW CYCLOPÆDIA,

COMPREHENDING
A COMPLETE SERIES OF
Essays, Treatises, and Systems,
ALPHABETICALLY ARRANGED;
WITH A GENERAL DICTIONARY OF
ARTS, SCIENCES, AND WORDS:
THE WHOLE
PRESENTING A DISTINCT SURVEY OF
Human Genius, Learning, and Industry.
ILLUSTRATED WITH
ELEGANT ENGRAVINGS;
THOSE ON NATURAL HISTORY BEING FROM ORIGINAL DRAWINGS BY EDWARDS AND OTHERS, AND BEAUTIFULLY COLOURED AFTER NATURE.

BY JOHN MASON GOOD, ESQ. F.R.S.
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MR. NEWTON BOSWORTH,
OF CAMBRIDGE;
ASSISTED BY OTHER GENTLEMEN OF EMINENCE, IN DIFFERENT DEPARTMENTS OF LITERATURE.

VOL. XI.
SPA — TZE.

LONDON:
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1813.

PANTOLOGIA.

SPA, a town of the Netherlands, in the territory of Liege, famous for its mineral waters. Tha tcalled the Old Spa consists of miserable cottages, and is properly nothing but the suburb to the other. The houses of the New Spa are mostly wood and plaster; but the more modern ones are of brick and stone. The church of the capuchins, and the parish-church, are both seated upon eminences. The names of the five principal wells are Pouhon, Geronflerd, Saviniere, Watpotz, and Tunnelet. The inhabitants are employed in making toys for strangers. Spa is seated in a valley, surrounded by mountains, 17 miles S.E. of Liege.

Spa water. This mineral water appears to be a very strongly acidulous chalybeate, containing more iron, and carbonic acid, than any other mineral spring. What applies to the use of chalybeates will apply to this water.

SPACE. *s.* (*spatium*, Lat.) 1. Room; local extension (*Locke*). 2. Any quantity of place (*Burnet*). 3. Quantity of time (*Wilkins*). 4. A small time; a while (*Spenser*).

Space, (*spatium*), a simple idea, the modes whereof are distance, capacity, extension, duration, &c.

Space, considered barely in length between any two bodies, is the same idea which we have of distance.

If it be considered in length, breadth, and thickness, it is properly called capacity.

When considered between the extremities of matter, which fills the capacity of space with something solid, tangible, and moveable, it is then called extension.

So that extension is an idea belonging to body only; but space, it is plain, may be considered without it.

Space therefore, in the general signification, is the same thing with distance considered every way, whether there be any solid matter in it or not.

Each different distance is a different modification of space; and each idea of any different space is a simple mode of this idea. Such are an inch, foot, yard, &c. which are the ideas of certain stated lengths, which men settle in their minds for the use, and by the custom of measuring. When these ideas are made familiar to men's thoughts, they can in their minds repeat them as often as they will, without joining to them the idea of body, and frame to themselves the ideas of feet, yards, and fathoms, beyond the utmost bounds of all bodies; and by adding these still to one another, they can enlarge their idea of space, as much as they please.

From this power of repeating any idea of distance, without being ever able to come to an end, we acquire the idea of immensity.

Another mode, or modification, of space, is taken from the relation of the parts of the termination of extension, or circumscribed space amongst themselves; and this is what we call figure. This the touch discovers in sensible bodies, whose extremities come within our reach; and the eye takes, both from bodies and colours whose boundaries are within its view; where, observing how the extremities terminate, either in straight lines, which meet at discernible angles, or in crooked lines, wherein no angles can be perceived; by considering these as they relate to one another in all parts of the extremities of any body or space, it acquires the idea we call figure; which affords to the mind infinite variety.

Another mode belonging to this head is that of place.

Another mode of space, is the idea which we get from the fleeting, and perpetually perishing, parts of succession, which we call duration.

Space is usually divided into absolute and relative.

Absolute space, is that considered in its own nature, without regard to any thing external, which always remains the same, and is infinite and immoveable.

Relative space, is that moveable dimension, or measure of the former, which our senses define by its positions to bodies within it; and this the vulgar use for immoveable space.

Relative space, in magnitude and figure, is always the same with absolute; but it is not necessary it should be so numerically: as if you suppose a ship to be, indeed, in absolute rest, then the places of all things within her will be the same absolutely and relatively, and nothing will change its place; but suppose the ship under sail, or in motion, and she will continually pass through new parts of absolute space; but all things on board considered relatively, in respect to the ship, may be, notwithstanding, in the same places, or have the same situation and position, in regard to one another.

The Cartesians, who make extension the essence of matter, assert, that the space any body takes up, is the same thing with the body itself; and that there is no such thing as mere space, void of all matter, in the universe: but this see disproved under VACUUM.

The Cartesians, who do not allow of any distinction between space and matter, were naturally enough led to the opinion, that space or extension was a substance. Others, who admit a vacuum, and consequently an essential difference between space and matter, assert also that space is a substance. Among these we find s'Gravesande's Introd. ad Philos. sect. 19.

Others put space into the same class of beings as time and number; that is, they make it to be no more than a notion of the mind. Hence, according to these authors, absolute space, of which the Newtonians speak, is a mere chimera. See the writings of the late bishop of Cloyne, passim.

Those who wish to be acquainted with all the intricacies which attend the different modes of considering space, and to know what can be advanced by two very acute men upon so abstruse a subject, should read the Collection of Papers which passed between Mr. Leibnitz and Dr. Clarke, in the Years 1715 and 1716, relating to the Principles of Natural Philosophy and Religion. See also the proof that "Space is a mere abstract idea, and does not signify any thing which has a real and positive existence without us," in Doddridge's valuable Lectures on Pneumatology, Lect. 46.

It has been seriously disputed whether space be God, or whether it be nothing!

SPACE, in geometry, denotes the area of any figure; or that which fills the interval or distance between the lines that terminate or bound it. Thus,

The parabolic space is that included in the whole parabola. The conchoidal space, or the cissoidal space, is what is included within the cavity of the conchoid or cissoid. And the asymptotic space, is what is included between an hyperbolic curve and its asymptote. By the new methods now introduced, of applying algebra to geometry, it is demonstrated that the conchoidal and cissoidal spaces, though infinitely extended in length, are yet only finite magnitudes or spaces.

SPACE, in mechanics, is the line a moveable body, considered as a point, is conceived to describe by its motion.

SPA'CIOUS. *a.* (*spatiosus*, Lat.) Wide; extensive; roomy; not narrow (*Cowley*).

SPA'CIOUSLY. *ad.* Extensively.

SPA'CIOUSNESS. *s.* (from *spacious.*) Roominess; wide extension.

SPA'DDLE. *s.* (diminutive of *spade.*) A little spade (*Mortimer*).

SPA'DE. *s.* (ꞅpaꝺ, Sax. *spade*, Dutch.) 1. The instrument of digging (*Brown*). 2. A deer three years old (*Ainsworth*). 3. A suit of cards.

SPA'DEBONE. *s.* (named from the form.) The shoulderblade (*Drayton*).

SPADICEOUS COLOUR, in botany, the colour of the spadix in the palm; it is commonly translated a bay-colour, from the Greek βαιος. Ray says it is a colour approaching to bay or chesnut, but with more red in it.

SPADI'LLE. *s.* (*spadille*, or *espadille*, Fr.) The ace of spades at ombre.

SPADIX, in botany, the receptacle in palms, and some other plants, proceeding from a spath. It is either branched, as in palms; or simple, as in dracontium, &c.—In some it is one-flowered; in others many-flowered.

SPAGNOLETTO (Joseph Ribera), an eminent painter, born in 1589, at Xativa, a city in Spain. He travelled into Italy, and there applied to painting under the greatest masters. He then went and settled at Naples, where he acquired great wealth by his being constantly employed for the viceroy, and for the greatest potentates of Europe. His natural turn was to describe subjects which excite terror, whether he took them from sacred or profane history, as the Murder of the Innocents, and Ixion and Prometheus. The strength of his expression, and the force of his colouring, give extraordinary relief to his figures, and make his works universally esteemed. He died in 1656.

SPAIN, a kingdom of Europe, 700 miles long and 500 broad; bounded on the N. by the bay of Biscay, N.E. by the Pyrenees, which separate it from France, E. and S. by the Mediterranean, S.W. by the Atlantic, and W. by Portugal and the Atlantic. Its capital is Madrid, and it contains the provinces of Old and New Castile, Andalusia, Arragon, Estremadura, Galicia, Leon, Catalonia, Granada, Valencia, Biscay, Asturias, Murcia, and Upper Navarre, some of which have been separate kingdoms. The extent of Spain is about 224,970 English square miles; and the population was, in 1803, estimated at 10,351,075 persons. The air is dry and serene, except during the equinoctial rains, but excessively hot, in the southern provinces, in June, July, and August. The vast mountains, however, that run through Spain, are beneficial to the inhabitants by the refreshing breezes that come from them in the S. parts; though those in the N. and N.E. are in the winter very cold. The soil is very fertile; but there are large tracts of uncultivated ground; and the superior attention paid to the large flocks of sheep greatly impedes the progress of agriculture. The produce of the country is wheat, barley, saffron, honey, silk, salt, saltpetre, hemp, barilla, and even sugar-canes, with the richest and most delicious fruits that are to be found in France and Italy; and its wines are in high esteem. Wolves are the chief beasts of prey that infest Spain. The wild bulls have so much ferocity, that bull-fights were the most magnificent spectacle the court of Spain could exhibit. The domestic animals are horses, that are remarkably swift, mules, asses, beeves, and sheep, the wool of which is superior to any in Europe. Spain abounds in minerals and metals: cornelian, agate, jacinth, loadstone, turcois stones, quicksilver, iron, copper, lead, sulphur, gypsum, calamine, crystal, marbles of several kinds, porphyry, the finest jasper, and even diamonds, emeralds, and amethysts, are found here. Anciently it was celebrated for gold and silver mines; but since the discovery of America no attention has been paid to them. The principal rivers are the Douero, Tajo, Guadiana, Guadalquiver, and Ebro. Spain, formerly the most populous kingdom in Europe, is now very thinly inhabited; to which various causes have contributed, as the expulsion of the Moors, the emigrations to the colonies, the vast numbers and celibacy of the clergy, and the indolence of the natives. Here is a want even of the most necessary trades; and of the few to be met with, the greatest part are in the hands of the French, who are very numerous in Spain; the natives themselves, beside their aversion to work, disdaining to stoop to handicrafts. They are not, however, wholly without manufactures, but they are far short of that flourishing condition they might attain; for they are checked by the royal monopolies, which extend to broad cloth, china, glass, pottery, paper, saltpetre, salt, sulphur, tobacco, and some others. The Spaniards in general are tall, their complexions swarthy, their countenances expressive. The beauty of the ladies reigns chiefly in their novels and romances: in their persons they are small and slender. Jealousy is no longer the characteristic of a Spanish husband: the married ladies have here their cortejo, or male attendant, in the same manner as the Italians have their cicisbeo. The established religion is popery; and here the inquisition once reigned in all its horrors; but, if it still exists, it has been lately rendered, by the intervention of powerful authority, comparatively harmless. There are eight archbishoprics, 46 episcopal sees, and 24 universities, or rather academies. The Spanish language springs from the Roman, but many of the words are derived from the Arabic, used by the Moors, who for seven centuries held dominion in this country: the speech is grave, sonorous, and very melodious. Spain, once the most free, is now one of the most despotic monarchies in Europe. It had once its cortes or parliaments, which had great privileges; but till lately, though not absolutely abolished, they had no part in the government. They are assembled indeed, occasionally (as at the accession of the monarch) but merely as an appendage to the royal state, without power, or any other consequence than what results from their individual rank. But the despotism of the late monarchy was balanced by the power of the church, to which the nobles are submissive devotees; and by many councils, which are responsible for any unwise or unsuccessful measures. In 1808, the French attempted to overturn the government of this country; and, having allured the royal family away, the Spaniards appointed a supreme Junta of government of the kingdom, who, aided by the British, are endeavouring to expel Bonaparte's brother, Joseph, and to restore Ferdinand VII. their absent king.

Our English soldiers have here shown that they still retain their superiority to all other troops; and our excellent general the marquis of Wellington has, by his skill, courage, perseverance, and success, gained himself a name, which will descend to posterity with our Marlboroughs, and our Wolfes, adorned by the honours and accompanied by the thanks of the British nation.

SPAIN (New). See MEXICO.

SPAIN (Pellitory of). See PYRETHRUM.

SPAKE. The old preterit of *speak.*

SPALDING, a town in Lincolnshire, with a market on Tuesday. It is seated on the Welland, and from its neatness, and the branches of the river in the streets, resembles a Dutch town. It has a good carrying trade in corn and coal; and much hemp and flax is grown in its neighbourhood. It is 14 miles S. by W. of Boston, and 97 N. of London.

SPALLANZANI (Lazarus), a naturalist, born at Scandiano near Reggio, 1729. Being elected professor of Pavia, he devoted himself to natural history, and made various experiments in physiology. In 1779 he began to travel, and in 1786 visited Constantinople, the plains of Troas, and the islands of Corfu and Cythera. He afterwards came to Vienna, and in 1788, examined, with philosophical accuracy, the productions of the Appenines. He died of an apoplexy in 1799, at Pavia. He published, Letters on the Origin of Fountains —Experiments on the Re-production of Animals—Essays on Animalculæ in Fluids—Microscopical Experiments—Memoirs on the

Circulation of the Blood—Observations on the Transpiration of Plants—Travels in the Two Sicilies and the Appenines, 6 vols. &c.

SPAN. *s.* (ꞅpan, ꞅponne, Sax. *span*, Dut.) 1. The space from the end of the thumb to the end of the little finger extended; nine inches (*Hold.*). 2. Any short duration (*Walk.*).

To SPAN. *v. a.* 1. To measure by the hand extended (*Tickel*). 2. To measure (*Herbert*).

SPAN. The preterit of *spin*.

SPA'NCOUNTER. SPA'NFARTHING. *s.* (from *span*, *counter*, and *farthing*.) A play at which money is thrown within a span or mark (*Donne*).

SPANDAU, a town of Germany, in the middle marche of Brandenburg, surrounded on all sides by morasses, and close to it is a fine fortress. The arsenal is in subterranean vaults, and there is a prison for state criminals. It is seated on the Havel, eight miles N.W. of Berlin, and 17 N.E. of Brandenburg. Lon. 13. 23 E. Lat. 52. 36 N.

SPANDRELL, in architecture, the solid work on each haunch of an arch, to keep it from rising or spreading.

SPA'NGLE. *s.* (*spange*, German; a locket.) 1. A small plate or boss of shining metal. 2. Any little thing sparkling and shining (*Glanville*).

To SPA'NGLE. *v. a.* (from the noun.) To besprinkle with spangles or shining bodies (*Donne*).

SPANHEIM (Frederic), divinity professor at Leyden, was born at Amberg, 1600. He refused a professorship at Lausanne, and in 1631 succeeded to a divinity chair at Geneva, which he left in 1642 to settle at Leyden. Here he was distinguished as a professor, and as a preacher, and died in 1649. He wrote Exercitationes de gratiâ universali, 3 vols. 8vo.—Dubia evangelica, 2 vols. 4to. &c.

SPANHEIM (Ezekiel), eldest son of the preceding, was born at Geneva, 1629. At 16 he wrote a defence of Buxtorf against Capellus, in favour of the Hebrew characters, which his antagonist declared had been lost by the Jews, but preserved by the Samaritans. This performance he afterwards called unripe fruit, and candidly assented to the opinion of Capellus. On his father's death he left Leyden for Geneva, where he was made professor of eloquence, and soon after tutor to the son of the elector palatine. He was employed by the elector as envoy to the court of Rome, where he was treated with great respect by Christina of Sweden, and other great characters. After being in several negociations in Holland, at Mentz, at the congress of Breda, and in England, he entered into the service of the elector of Brandenburg, and was his envoy extraordinary at Paris, and in London. When the elector of Brandenburg assumed the title of king, he created him his minister, baron of the Prussian dominions, and again in 1702 employed him as his ambassador in England. He spent there the remainder of his days, and died in 1710. He wrote much, and with great success and ability. The best known of his works are, de Præstantiâ, et usu numismatum Antiquorum, 2 vols. folio—Letters and Dissertations on Medals—Julian's works edited with notes, folio—besides notes on classical authors, &c.

SPANHEIM (Frederic), brother to the preceding, was born at Geneva, in 1632, and carried to Leyden by his father. After distinguishing himself as a preacher at Utrecht, he was invited to the chair of divinity professor at Heidelberg, 1665, and he removed in 1670 to Leyden, where he succeeded as professor of divinity and sacred history. He died in 1701, in consequence of a palsy. His writings are very numerous, and were printed at Leyden, 3 vols. folio, chiefly on theological subjects. The chief is his Ecclesiastical History.

SPANIEL. The name of a dog (see CANIS), of which there are many varieties. Of water spaniels there are two, a larger and a smaller: of land spaniels there are two also. The water spaniels of both variety are chiefly employed in wild fowl shooting, in moors, marshes, and the neighbourhood of rivers; where ducks, wigeons, teal, coots, moor-hens, dab-chicks, and snipes, are to be found; to all which they are particularly appropriate; not more for their indefatigable industry in finding the game, than for their surmounting every obstacle to recover it, and bring it to hand when killed. They are also of wonderful sagacity, fidelity, and observation; their olfactory powers almost exceed belief, by which alone they are taught the most incredible performances. Sticks, gloves, handkerchiefs, coin, or any other article left some miles behind by the owner upon the road, or any remote spot (totally unknown to them), will they retrace to any distance upon a signal being given with the hand, and never relinquish the search till they bring it safe to their master.

The large springing and small cocker land spaniels, although they vary in size, differ, like the two kinds of water spaniels, but little in their qualifications, except that the former is rather slower in action; neither catching the scent of the game so suddenly as the latter, nor seeming to enjoy it with the same enthusiasm when found. The small cocking spaniel has also the advantage of getting through the low bushy covert with much less difficulty than the larger spaniel, and does not tire so soon, whatever may have been the length and labour of the day. Both these varieties are frequently used as finders in coursing with greyhounds, and are indefatigable in their exertions; from the time they are thrown off in pursuit of game, the tail is in a perpetual motion (called feathering), by the increasing vibration of which, an experienced sportsman well knows when he gets nearer the object of attraction.

As it is the habit of this animal to give the most outrageous proof of joy upon finding, or coming upon the foot or haunt of game, so it is equally his habit never to relax in his perseverance till he brings it to view. It is therefore necessary for all young and inexperienced sportsmen, who take the field with spaniels, not to be too tardy in their own motions, but to let their agility keep pace with the incessant activity of their dogs; inattentive to which they may expect to cover many a weary mile without a successful shot. Young spaniels, when trained for the field, should be taken out singly, in company with one or more old and seasoned dogs, to whom they will mostly attend in every action, and the sooner acquire the necessary knowledge of the business they are engaged in. If young dogs alone be taken out, and in great number, their eagerness and emulation frequently occasion them (particularly in covert, where they are safe from correction) to hunt or chase one thing for want of finding another; and in the event of not being corrected when necessary, to become uncertain babblers, and never to be relied upon. The judicious and experienced sportsman will never be seen to hunt spaniels with pointers either in or out of covert; for, although it can do little or no injury to the former, it may very materially warp the discipline, if not totally destroy the habits of the latter.

SPANISH TOWN. See St. Jago.

Spanish brown, in botany. See Spartium.

Spanish elm, in botany. See Cordia.

Spanish potatoes, in botany. See Convolvulus.

Spanish chalk, in mineralogy, a species of talc. See Talcum.

Spanish fly. See Cantharides and Lytta.

Spanish liquorice. See Glycyrhiza.

SPA'NKER. *s.* A small coin (*Denham*).

SPA'NNER. *s.* The lock of a carabine (*Howel*).

SPAR, in mineralogy. See Spatum.

Spar, denotes also a small beam; sometimes the bar of a gate.

To Spar. *v. n.* To fight with prelusive strokes.

To Spar. *v. a.* (ꞅpaꞃꞃan, Saxon; *sperren*, German.) To shut; to close; to bar (*Spenser*).

SPA'RABLE. *s.* (ꞅpaꞃꞃan, Sax. to fasten.) Small nails.

SPA'RADRAP. *s.* (In pharmacy.) A cerecloth (*Wiseman*).

SPARAGUS. See Asparagus.

To SPARE. *v. a.* (ꞅpaꞃan, Sax. *spaeren*, Dutch; *espargner*, Fr.) 1. To use frugally; not to waste; not to consume (*Milton*). 2. To have unemployed; to save from any particular use (*Knolles*). 3. To do without; to lose willingly (*Ben Jonson*). 4. To omit; to forbear (*Dryden*). 5. To use tenderly; to forbear; to treat with pity; to use with mercy (*Common Prayer*). 6. To grant; to allow; to indulge (*Roscommon*). 7. To forbear to inflict or impose (*Dryden*).

To Spare. *v. n.* 1. To live frugally; to be parsimonious (*Shakspeare*). 2. To forbear; to be scrupulous (*Knolles*). 3. To use mercy; to forgive (*Bacon*).

Spare. *a.* 1. Scanty; parsimonious; frugal (*Locke*). 2. Superfluous; unwanted (*Addison*). 3. Lean; wanting flesh; macilent (*Milton*).

Spare. *s.* (from the verb.) Parsimony; frugal use; husbandry: not in use (*Bacon*).

SPA'RER. *s.* (from *spare.*) One who avoids expence (*Wotton*).

SPA'RERIB. *s.* (*spare* and *rib.*) Ribs cut away from the body, and having on them spare or little flesh; as, a *sparerib* of pork.

SPARGANIUM. Bur-reed. In botany, a genus of the class monœcia, order triandria. Ament roundish; calyx three-leaved; corolless. Female: stigma cloven; drupe dry, one-seeded. Three species, common to the ditches, pools, and canals of our own country.

SPARGEFA'CTION. *s.* (*spargo*, Latin.) The act of sprinkling.

SPA'RING. *a.* (from *spare.*) 1. Scarce; little (*Bacon*). 2. Scanty; not plentiful (*Pope*). 3. Parsimonious; not liberal (*Dryden*).

SPA'RINGLY. *ad.* (from *sparing.*) 1. Not abundantly (*Bacon*). 2. Frugally; parsimoniously; not lavishly (*Hayward*). 3. With abstinence (*Atterbury*). 4. Not with great frequency (*Atterbury*). 5. Cautiously; tenderly (*Bacon*).

SPARK. *s.* (ꞅpeaꞃca, Sax. *sparke*, Dutch.) 1. A small particle of fire, or kindled matter (*Shakspeare*). 2. Any thing shining (*Locke*). 3. Any thing vivid or active (*Shakspeare*). 4. A lively, showy, splendid, gay man (*Prior*). 5. A lover.

To Spark. *v. n.* (from the noun.) To emit particles of fire; to sparkle: not used (*Spenser*).

SPA'RKFUL. *a.* (*spark* and *full.*) Lively; brisk; airy: not used (*Camden*).

SPA'RKISH. *a.* (from *spark.*) 1. Airy; gay. A low word (*Walsh*). 2. Showy; well dressed; fine (*L'Estrange*).

SPA'RKLE. *s.* (from *spark.*) 1. A spark; a small particle of fire (*Dryden*). 2. Any luminous particle (*Pope*).

To Spa'rkle. *v. n.* (from the noun.) 1. To emit sparks. 2. To issue in sparks (*Milton*). 3. To shine; to glitter (*Watts*). 4. To emit little bubbles as liquor in a glass.

SPA'RKLINGLY. *ad.* (from *sparkling.*) With vivid and twinkling lustre (*Boyle*).

SPA'RKLINGNESS. *s.* (from *sparkling.*) Vivid and twinkling lustre (*Boyle*).

SPARMANNIA, in botany, a genus of the class polyandria, order monogynia. Calyx four-leaved; petals four, reflected; nectaries numerous, irregular in their surface, surrounding the stamens; capsule angular, prickly, five-celled. One species; a hairy shrub of the Cape; with alternate, heart ovate leaves, and umbelled white flowers.

SPARROW, in ornithology. See Tricogilla.

Sparrow hawk. See Falca.

Sparrow wort. See Bassarina.

Sparrow (Anthony), of Depden, Suffolk, was expelled from Queen's college, Cambridge, for refusing to subscribe to the covenant, 1643. At the restoration he was placed at the head of his college, made archdeacon of Sudbury, and in 1667 raised to the see of Exeter, and next translated to Norwich. He compiled a collection of articles, injunctions, canons, &c.

and also Rationale, or the Book of Common Prayer, 1657, 8vo. improved afterwards with additions. He died in 1685.

SPA'RRY. *a.* (from *spar.*) Consisting of spar.

SPARSE, in botany. Scattered. Neither opposite nor alternate, nor in any apparent regular order. Applied to branches, to leaves, as in several sorts of lily; to peduncles or flowers, to calycine scales, as in crepis barbata. "With regard to branches," says Dr. Berkenhout, "an accurate observer will find that, notwithstanding their irregular appearance, they form a spiral line round the trunk, regularly completing the circle in a determinate number of steps."

SPARTA, a celebrated city of Peloponnesus, the capital of Laconia, situate on the Eurotas, about 30 miles from its mouth. It received its name from Sparta, the daughter of Eurotas, who married Lacedæmon. See LACEDÆMON.

SPARTACUS. The most celebrated of this name is a Thracian gladiator, who, having been kept at Capua in the house of Lentulus, escaped from the place of his confinement with 30 of his companions, and took up arms against the Romans. He soon found himself at the head of a considerable number of followers, with whom he attacked the Roman generals in the field of battle. Two consuls and other officers were defeated with much loss, and Spartacus, superior in counsel and abilities, became more terrible. Crassus was sent against him, but this celebrated general at first despaired of success. A bloody battle was fought, in which at last the gladiators were defeated. Spartacus behaved with great valour, and at last he fell upon a heap of Romans, whom he had sacrificed to his fury, B. C. 71. In this battle no less than 40,000 of the rebels were slain, and the war totally finished.

SPARTÆ, or SPARTI, a name given to those men who sprang from the dragon's teeth, which Cadmus sowed. They all destroyed one another, except five, who survived and assisted Cadmus in building Thebes.

SPARTANI, or SPARTIATÆ, the inhabitants of Sparta. See SPARTA, LACEDÆMON.

SPARTEL (Cape), a promontory on the coast of Barbary, at the entrance of the straits of Gibraltar. Lon. 5. 56 W. Lat. 35. 50 N.

SPARTIVENTO (Cape), a promontory of the kingdom of Naples, at the S.E. extremity of Calabria Ulteriore. Lon. 16. 40 E. Lat. 37. 50 N.

SPARTIUM. Broom. In botany, a genus of the class diadelphia, order decandria. Stigma longitudinal, villous above; filaments all united, adhering to the germ; calyx produced downwards. Twenty-five species, chiefly natives of Barbary and the south of Europe; one, spartium scoparium, common to our own dry fields. They are thus subdivided into nearly equal partitions.

A. Leaves simple.
B. Leaves ternate.

The following are cultivated.

1. S. scoparium. Common broom: formerly employed medicinally under the name of genista, but long since disused. See GENISTA.
2. S. junceum. Spanish broom.
3. S. radiatum. Starry broom.
4. S. monospermum. White-flowered, single-seeded broom.
5. S. sphærocarpum. Yellow-flowered, single-seeded broom.
6. S. scorpius. Scorpion broom.
7. S. angulatum. Angular-branched broom.
8. S. spinosum. Prickly broom.

The flower-buds of many of these are in some countries pickled and eaten as capers; and the seeds have been used as a miserable substitute for coffee. The branches are employed in making besoms, and in tanning leather; the old wood furnishes the cabinet-maker with beautiful materials for veneering; the tender branches are sometimes mixed with hops for brewing; and the macerated bark may be manufactured into cloth.

The three first sorts are hardy, the rest tenderer, especially when young. They may be all raised from seeds; but the double blossomed are best propagated by layers and cuttings.

SPARUS. Gilt-head. In zoology, a genus of the class pisces, order thoracica. Teeth (generally) strong; the grinders somewhat obtuse and crowded; lips double; gill-membrane five-rayed, the cover scaly; body compressed; lateral line curved on the hind-part; pectoral fins rounded. Forty species, scattered through the seas of the globe; four common to our own coasts. They are thus divided into sections.

A. Marked with a black spot.
B. Mostly red.
C. Body marked with lines.
D. Various.

The following are chiefly worthy of notice.

1. S. auratus. Lunulated gilt-head. Between the eyes a semilunar gold spot. This species inhabits the British coasts, and haunts the boldest, deepest, and most rocky shores. They feed upon oysters and other shell-worms, which they comminute with their strong teeth. For this purpose they are furnished with flat back teeth, resembling the grinders of quadrupeds, and fulfilling the same office. Besides these teeth, and small sharp ones on the fore part of the jaw, the inner part of the mouth is lined with hard bones, which assist in grinding and masticating.

This species is a coarse fish, and in modern times held in no great esteem, though the caprice of the ancient Romans set a high value upon such as were fed with the oysters of the Lucrine lake, perhaps for no other reason than because they were a fashionable dish at a certain period: they seem, from Martial's account, to have thought meanly of the gilt-head in general.

The lunulated gilt-head grows frequently to the weight of ten pounds: the form of the body is deep, resembling that of a bream; the back sharp, and of a dusky green; the sides golden tinged with brown; at the farther angle of the coverts of the gills, frequently a black spot, below it sometimes a purple one. In this species the teeth are covered with lips; and the back teeth are not so flat as in some others of the genus. There is but one dorsal fin, which stretches a considerable way along the back, and has twenty-four rays; the first eleven spinous, and the rest cartilaginous: the three former rays of the ventral fin are also spinous, the others soft: pectoral fins soft, terminating in acute angles: the tail has seventeen rays, and is much forked. It is caught abundantly in winter in the Mediterranean.

2. S. insidiator. Body red, yellowish at the sides; tail a little forked. Inhabits the Indian sea; ten inches long; catches aquatic insects like the chætodon rostratus by its snout, which it can lengthen out into a tube; body broadish, fat, coated with large scales of a metallic green colour at the edge; when dead becomes brown; flesh eatable.

3. S. berda. Whitish-ash; lateral scales with each a transverse brown band in the middle; dorsal spines recumbent. Inhabits the Red sea; body oval; back gibbous, with obsolete bands, beneath white; scales broad, round, entire.

4. S. radiatus. Pudding-fish. Tail entire; lateral line composed of linear scales divided into three bifid branches. Inhabits Carolina: above green; purple at the sides, beneath rufous; head varied with blue, yellow and green streaks.

5. S. niger. Toothed gilt-head. Back black; sides brighter; belly silvery. Found, according to Mr. Pennant, in Yorkshire.

SPASM. (*spasmus*, Σπασμος, from Σπασμα; σπαω, to draw.) A spasm or convulsion. An involuntary contraction of the muscular fibres, or that state of the contraction of muscles which is not spontaneously disposed to alternate with relaxation. When the contractions alternate with relaxation, which are frequently and preternaturally repeated, they are called convulsions. Spasms are distinguished by authors into clonic and tonic spasms. In clonic spasms, which are the true convulsions, the contractions and relaxations are alternate, as in epilepsy; but in tonic spasms, the member remains rigid, as in locked jaw. See CONVULSION and TONIC SPASM.

SPASMI. Spasmodic diseases. The third order of the class neuroses of Cullen; characterised by a morbid contraction or motion of muscular fibres.

SPASMODIC COLIC. See COLICA.

SPASMOLOGY. (*spasmologia*, σπαςμολονια, from σπαςμος, a spasm, and λογος, a discourse.) A treatise on convulsions.

SPASMUS CYNICUS. The spasmus cynicus, or sardonic grin, is a convulsive affection of the muscles of the face and lips on both sides, which involuntarily forces the muscles of those parts into a species of grinning distortion. If one side only be affected, the disorder is nominated tortura oris. When the masseter, buccinator, temporal, nasal, and labial muscles are involuntarily excited to action, or contorted by contraction or relaxation, they form a species of malignant sneer. It sometimes arises from eating hemlock, or other acrid poisons, or succeeds to an apoplectic stroke.

SPAT. The preterit of *spit*.

SPATH, in botany, the calyx of a spadix, opening or bursting longitudinally, in form of a sheath. It is applied also to the calyx of some flowers which have no spadix; as narcissus, crocus, iris, &c.

A spathe may be one-valved, or two-valved.

Halved. Dimidiata. Investing the fructification on the inner side only.

Imbricate. One-flowered, two-flowered, &c.—Hence

SPATHACEÆ. The name of the eighth order in Linnéus's Fragments; and of the ninth in his Natural Orders.

SPATHELIA, in botany, a genus of the class pentandria, order trigynia. Calyx five-leaved; petals five; capsule three-sided, three-celled; seeds solitary. One species only, spathelia simplex, maiden plum-tree; a tree of Jamaica with a single stem, and flowers in a pyramidal, terminal spike.

To SPA'TIATE. *v. n.* (*spatior*, Lat.) To rove; to range; to ramble at large (*Bentley*).

To SPA'TTER. *v. n.* (ꞅpaꞇ, spit, Saxon.) 1. To sprinkle with dirt, or any thing offensive (*Addison*). 2. To throw out any thing offensive (*Shakspeare*). 3. To asperse; to defame.

To SPA'TTER. *v. n.* To spit; to sputter as at any thing nauseous taken into the mouth (*Milton*).

SPA'TTERDASHES. *s.* (*spatter* and *dash.*) Coverings for the legs by which the wet is kept off.

SPA'TLING POPPY. *s.* White behen (*Miller*).

SPA'TULA. *s.* A spattle or slice, used by apothecaries and surgeons in spreading plasters or stirring medicines (*Quincy*).

SPATULATE LEAF, in botany, a spatula-shaped leaf. Cujus figura subrotunda, basi angustiore lineari elongata. Roundish, with a long, narrow, linear base: like a spatula or a battledore: as in cistus incanus.

SPATUM, in mineralogy, a genus of the class earths, order calcareous. Consisting of carbonat of lime, a larger proportion of carbonic acid gass, and water; lamellous, shining, parasitical, soft, lightish, breaking into rhomboidal fragments; crackling in the fire. Twenty-three species, which may be thus subdivided.

A. Of a common figure; comprising three species.

1. S. opacum. Common spar. Calcareous spar. Sometimes opake or nearly so; sometimes with irregular fragments; more generally with a variable lustre. Found in Norway, Sweden, Germany, Switzerland, and Hungary, most commonly white, sometimes cinereous, blueish, greenish, yellowish, red, or blackish. One variety changes its lustre with respect to its position in the light.

2. S. arenarium. Diaphonous, with the foliations irregularly clustered. Found in Sweden and Saxony, white, grey, red, brown, or green.

3. S. pellucidum. Specular spar: pellucid spar: rhomboidal spar: the androdamas of Pliny. Pellucid; hyaline, or tinged; and sometimes doubling the objects by refraction. Found in Russia, Lapland, Norway, Sweden, and other mountainous parts of Europe; the refractive variety chiefly in Iceland; colour yellow, or yellowish, olive, greenish, blueish, smoky, blackish, rarely red or veined; when exposed to heat parts with its transparency and carbonic acid, and after calcination sometimes shines in the dark, if thrown upon hot coals.

B. Of a peculiar figure. Four species; cellular, cylindrical, globular compact, or globular with the globules empty or hollow. The following is alone worthy of notice.

4. S. stalactiticum: of a more or less cylindrical form.

α. Botryoidal.
β. Shrub-like.
γ. Coral-form.

Found in Bohemia and Hungary, the coralliform variety plentifully in the loose marl at St. Maws, Cornwall, where it is used for manure, and in North Wales. Its appearance has so much the resemblance of a coral as to be commonly mistaken for such; but it appears on examination to be aggregations of calcareous earth ramifying in the soft marl; colour white, yellowish white, or pale ferruginous from a small mixture of iron.

C. Crystallized. A numerous family, comprising not less than sixteen species. The following are the chief.

5. S. bracteatum. Calcareous spar. Foliated and sparry limestone. Crystallized carbonat of lime. Ten varieties.

α. With six-sided tables.
β. With orbicular tables.
γ. With tables scattered.
δ. With tables imbricate.
ε. With the faces of the rhomb in an inverse order of the laminæ of the nucleus.
ζ. With the tables aggregate in series.
η. With the tables aggregate in a rosular form.
θ. With the tables aggregate in cells.
ι. Pearl spar. With the tables aggregate in a prismatic form.
κ. Pearl spar. With the tables aggregate in a pyramidal form.

Found chiefly in limestone rocks in most parts of Europe: colour white, rarely yellowish, pale-brown, reddish, green, very rarely crimson, blueish, purple or black; never quite opake, but sometimes with a pearly lustre.

6. S. prismaticum. Truncated nitre: crystalline spar, with perfectly six-sided prisms: with the terminal faces of the prisms convex; with the alternate faces narrower; with the two opposite faces far exceeding the rest; and in another variety emitting a phosphorescent light when burnt. Found in Derbyshire, Hercynia, Saxony, Silesia, Hungary, and Spain, in mines; generally white, and frequently transparent; commonly aggregate, scattered or in regular series.

7. S. dodecahedron. Crystalled spar. Sparry tufa. With six-sided prisms, terminated at each end by a three-sided pyramid. Five or six varieties. Found in the mines of Derbyshire, Germany, Saxony, Hungary, &c.; generally pellucid, rarely yellowish, or greenish, most commonly white, with the pyramids sometimes depressed; the crystals sometimes thinner, sometimes thicker, frequently in pairs cutting each other at right angles, or clustered in regular series, or in fascicles, or in a globular olive, or pyramidal form.

8. S. hyodon. Dog's-tooth spar. Irregular nitre. With a double six-sided pyramid. Six or seven varieties. Found in the mines of Derbyshire and Cumberland, in Sweden, Hungary, and Germany; more frequently white than yellowish, or with a tinge of green: sometimes pellucid, sometimes opake; the crystals frequently very small, rarely transversely grooved, and often placed in a regular series.

SPAVIN, a disease on the limbs of horses, which causes them to halt; and of three kinds, viz. the blood-spavin, the bog-spavin, and the bone-spavin.

1. Blood-spavin is a swelling and dilatation of the vein that runs along the inside of the hock, forming a little soft swelling in the hollow part, and is often attended with a weakness and lameness of the hock.

The cure should be first attempted with restringents and a bandage, which will contribute greatly to strengthen all weaknesses of the joint, and frequently will remove this disorder, if early applied; but if by these means the vein be not reduced to its usual dimensions, the skin should be opened, and the vein tied with a crooked needle, and wax-thread passed underneath it, both above and below the swelling; and the turgid part suffered to digest away with the ligatures; for this purpose, the wound may be daily dressed with turpentine and honey incorporated together.

In treating the blood-spavin, Mr. Denny advises repeated blistering, and afterwards a compress of folded linen, moistened in a lotion of sal ammonia and sugar of lead dissolved in about equal parts of vinegar and water.

The horse, he says, should be allowed only walking exercise for three or four weeks.

2. Bog-spavin is a ganglion or an encysted tumour on the inside of the hough, or, according to Bracken, a collection of brownish gelatinous matter contained in a bag or cyst, which he reckons to be the lubricating matter of the joint altered, the common membrane that incloses it forming the cyst: this case he has taken pains to illustrate in a young colt of his own; when the spavin in this case was pressed hard on the inside of the hough, there was a small tumour on the outside, which convinced him the fluid was within-side of the joint: he accordingly cut into it, discharged a large quan-

tity of this gelatinous matter, dressed the sore with dossils dipped in oil of turpentine, putting into it, once in three or four days, a powder made of calcined vitriol, alum, and bole: by this method of dressing, the bag sloughed off and came away, and the cure was successfully completed without any visible scar.

This disorder, according to the above description, will scarcely submit to any other method except firing, and then the cyst ought to be penetrated to make it effectual: but in all obstinate cases that have resisted the above methods, both the cure of this and the swellings called wind-galls should be attempted in this manner. If, through the pain attending the operation or dressings, the joint should swell and inflame, foment it twice a-day, and apply a poultice over the dressings till it is reduced.

3. Bone-spavin, is a species of spina ventosa, bony excrescence, or hard swelling, growing on the inside of the hock of a horse's leg. Without entering at all into the cause of this disorder, we shall content ourselves with describing the different kinds of it, by their symptoms, and then enter on the method of cure.

A spavin that begins on the lower part of the hock is not so dangerous as that which puts out higher, between the two round processes of the leg bone; and a spavin near the edge is not so bad as that which is more inward towards the middle, as it does not so much affect the bending of the hock. A spavin produced by a kick or blow is at first no true spavin, but a bruise on the bone or membrane which covers it; therefore not of that consequence as when it proceeds from a natural cause: and those that put out on colts and young horses are not so bad as those that happen to horses in their full strength and maturity; but in very old horses they are generally incurable. The usual method of treating this disorder is by blistering and firing, without any regard to the situation or cause whence it proceeds. Thus, if a fulness on the fore-part of the hock come upon hard riding, or any other violence, which threatens a spavin; in that case, such cooling astringents are proper as are recommended in strains and bruises. These happening to colts and young horses are generally superficial, and require only the milder applications; for it is better to wear them down by degrees, than to remove them at once by severe means.

The hair is to be cut from the part as close as possible, and blistering ointment applied pretty thick over the skin; this should be done in the morning, and the horse kept tied up all day, without any litter, till night, when he may be untied, in order to lie down, and a pitch, or any sticking plaister, may be laid over it, and bound on with a broad tape or bandage, to keep all close. After the blister has done running, and the crust begins to dry and peel off, it may be applied a second time, in the same manner as before; and this second application generally takes greater effect than the first, and in colts and young horses makes a perfect cure.

When the spavin has been of long standing, it will require to be renewed perhaps five or six times; but after the second application a greater distance of time must be allowed, otherwise it might leave a scar, or cause a baldness; to prevent which, once a fortnight or three weeks is perhaps enough: and it may in this manner be continued six or seven times, without the least blemish, and will generally be attended with success.

But the spavins that put out on elder horses, or full-aged horses, are apt to be more obstinate, as being seated more inward; and when they run among the sinuosities of the joint they are for the most part incurable, as they then lie out of the reach of applications, and are arrived to a degree of impenetrable hardness.

The usual method in these cases is to fire directly, or to use the strongest kind of caustic blisters; and sometimes to fire, and lay the blister immediately over the part: but this way seldom succeeds, farther than putting a stop to the growth of the spavin, and is apt to leave both a blemish and stiffness behind; besides the great risk run (by application of so severe a nature to the tendinous parts about the joints) of exciting violent inflammation, and destroying the limb. The safest and best way, therefore, is to make trial of blistering ointment in the first instance: and if this should not succeed, to fire the tumour with a thin iron forced pretty deep into the substance; after which it should be dressed with digestive.

SPAW. *s.* A place famous for mineral waters; any mineral water.

To SPAWL. *v. n.* (ꞅpœtlian, to spit, Sax.) To throw moisture out of the mouth (*Swift*).

SPAWL. *s.* (ꞅpatl, Sax.) Spittle; moisture ejected from the mouth (*Dryden*).

SPAWN. *s.* (*spene*, *spenne*, Dutch.) 1. The eggs of fish or of frogs (*Shakspeare*). 2. Any product or offspring (*Tillotson*).

To SPAWN. *v. a.* (from the noun.) 1. To produce as fishes do eggs (*Shakspeare*). 2. To generate; to bring forth (*Swift*).

To SPAWN. *v. n.* 1. To issue eggs as fish (*Brown*). 2. To issue; to proceed (*Locke*).

SPA'WNER. *s.* (from *spawn*.) The female fish (*Walton*).

To SPAY. *v. a.* (*spado*, Lat.) To castrate female animals (*Mortimer*).

SPAYED BITCH, a bitch upon whom an operation has been performed, by which she is deprived of the power of conceiving in future. An incision being made in the flank, midway between the hip-bone and the belly, the ovaries are extracted through the orifice, and separated from the parts to which they were united: these being returned, the wound is stitched up, and heals in a few days, if performed by a judicious practitioner, without farther trouble or inconvenience.

SPAYING. See CASTRATION.

To SPEAK. *v. n.* preterit *spake*, or *spoke*; participle passive *spoken*. (ꞅpecan, Saxon.)

1. To utter articulate sounds; to express thoughts by words (*Holder*). 2. To harangue; to make a speech (*Clarendon*). 3. To talk for or against; to dispute (*Shakspeare*). 4. To discourse; to make mention (*Tillotson*). 5. To give sound (*Shakspeare*). 6. *To* Speak *with.* To address; to converse with (*Knolles*).

To Speak. *v. a.* 1. To utter with the mouth; to pronounce (*Judges*). 2. To proclaim; to celebrate (*Shakspeare*). 3. To address; to accost (*Ecclesiasticus*). 4. To exhibit; to make known (*Milton*).

SPEA'KABLE. *a.* (from *speak.*) 1. Possible to be spoken. 2. Having the power of speech (*Milton*).

SPEA'KER. *s.* (from *speak.*) 1. One that speaks (*Watts*). 2. One that speaks in any particular manner (*Prior*). 3. One that celebrates, proclaims, or mentions (*Shakspeare*).

Speaker of the house of commons, a member of the house elected by a majority of the votes thereof, to act as chairman or president in putting questions, reading briefs or bills, keeping order, reprimanding the refractory, adjourning of the house, &c. The first thing done by the commons, upon the first meeting of a parliament, is to choose a speaker, who is to be approved of by the king, and who, upon his admission, begs his majesty that the commons, during their sitting, may have free access to his majesty, freedom of speech in their own house, and security from arrests. The speaker is not allowed to persuade or dissuade in passing a bill, but only to make a short and plain narrative; nor to vote unless the house be equally divided, in which case it is generally expected that he should vote with what is termed the opposition.

SPEAKING TRUMPET. See Trumpet.

SPEAR. *s.* (ꞅpeꞃe, Saxon; *spere*, Dutch.) 1. A long weapon with a sharp point, used in thrusting or throwing; a lance (*Cowley*). 2. A lance, generally with prongs to kill fish.

To Spear. *v. a.* (from the noun.) To kill or pierce with a spear.

To Spear. *v. n.* To shoot or sprout: commonly written *spire* (*Mortimer*).

Spear. The feather of a horse, called the stroke of the spear, is a mark in the neck, or near the shoulder, of some barbs, and some Turkish and Spanish horses, representing the blow or cut of a spear in those places, with some resemblance of a scar. This feather is deemed an infallible sign of a good horse.

Spear (King's), in botany. See Asphodelus.

Spear-mint. See Mentha sativa.

Spear-shaped. See Lanceolate.

Spear-wort. See Ranunculus.

Spear-wort-water. See Flamnacela.

SPEARAGE, in botany. See Asparagus.

SPEARMAN, one who uses a lance in battle.

SPE'CIAL. *a.* (*special*, French; *specialis*, Latin.) 1. Noting a sort or species (*Watts*). 2. Particular; peculiar (*Atterbury*). 3. Appropriate; designed for a particular purpose (*Davies*). 4. Extraordinary; uncommon (*Sprat*). 5. Chief in excellence (*Shaksp.*).

SPE'CIALLY. *ad.* (from *special.*) 1. Particularly; above others (*Deuteronomy*). 2. Not in a common way; peculiarly (*Hale*).

SPE'CIALTY. Specia'lity. *s.* (*specialite*, Fr. from *special.*) Particularity (*Hale*).

SPE'CIES. *s.* (*species*, Latin.) 1. A sort; a subdivision of a general term (*Watts*). 2. Class of nature; single order of beings (*Bentley*). 3. Appearance to the senses; any visible or sensible representation (*Ray*). 4. Representation to the mind (*Dryden*). 5. Show; visible exhibition (*Bacon*). 6. Circulating money (*Arbuthnot*). 7. Simples that have place in a compound.

Species, in natural history. The distinct forms of animals or vegetables originally so created, and producing, by certain laws of generation, others like themselves.—There are therefore as many species as there are different invariable forms or structures of animals or vegetables now existing. We commonly use the same termination both in the singular and plural, as we do in some other words of the same structure from the Latin. The duplication of the final is disagreeable to the ear, and perhaps we acquiesce the more readily in this anomaly, because so many of our plurals terminate in *es*.

SPECI'FICAL. Speci'fic. *a.* (*specifique*, Fr.) 1. That makes a thing of the species of which it is (*Newton*). 2. (In medicine.) Appropriated to the cure of some particular distemper (*Wiseman*).

Specific character. A circumstance or circumstances distinguishing one species from every other species of the same genus.

Specific gravity of living men. Mr. Robertson, in order to determine the specific gravity of men, prepared a cistern seventy-eight inches long, thirty inches wide, and thirty inches deep; and having procured ten men for his purpose, the height of each was taken, and his weight; and afterwards they plunged successively into the cistern. A ruler, graduated to inches and decimal parts of an inch, was fixed to one end of the cistern, and the height of the water noted before each man went in, and to what height it rose when he immersed himself under its surface.

The following table contains the several results of his experiments.

No. of men.	Height.		Weight.	Height of water before immersed.	Height of water when immersed.	Water raised.	Solidity	Weight of water.
	Feet.	Inc.	Pounds.	Inches.	Inches.	Inches.	Feet.	Pounds.
1	6	02	161	19,30	21,20	1,90	2,573	160,8
2	5	$10\frac{3}{8}$	147	19,25	21,16	1,91	2,586	161,6
3	5	$9\frac{1}{2}$	156	19,21	21,06	1,85	2,505	156,6
4	5	$6\frac{3}{4}$	140	19,17	21,21	2,04	2,763	172,6
5	5	$5\frac{7}{8}$	158	19,13	21,21	2,08	2,817	176,0
6	5	$5\frac{1}{2}$	158	19,09	21,26	2,17	2,939	183,7
7	5	$4\frac{3}{8}$	140	19,05	21,06	2,01	2,722	170,1
8	5	$3\frac{1}{8}$	132	19,01	20,86	1,85	2,505	156,6
9	5	$4\frac{1}{8}$	121	18,97	20,76	1,79	2,424	151,5
10	5	$3\frac{1}{4}$	146	18,93	20,66	1,73	2,343	146,4

One of the reasons, Mr. Robertson says, that induced him to make these experiments, was a desire of knowing what quantity of fir or oak timber would be sufficient to keep a man afloat in river or sea-water, thinking that most men were specifically heavier than river or common fresh water; but the contrary appears from the trials above recited: for, excepting the first and last, every man was lighter than his equal bulk of fresh water, and much more so than his equal bulk of sea-water: consequently, if persons, who fall into water, had presence of mind enough to avoid the fright usual on such accidents, many might be preserved from drowning; and a piece of wood not larger than an oar would buoy a man partly above water as long as he had spirits to keep his hold. Phil. Trans. vol. l. art. 5.

Specific gravity. See Gravity (Specific).

Specific name. Prænomen triviale. Commonly called the trivial name.—One of those happy inventions of Linnéus, by which he has facilitated and diffused the science of botany in a wonderful manner.—" A plant is perfectly named," says Linnéus (Philos. Bot. 202), " when it is furnished with a generic and specific name."—In the same page he distinguishes the latter from the nomen triviale; and calls it the essential difference.—Nomen specificum legitimum plantam ab omnibus congeneribus distinguat, triviale autem legibus etiamnum caret.—Nomen specificum est itaque differentia essentialis.

SPECI'FICALLY. *ad.* (from *specific.*) In such manner as to constitute a species; according to the nature of the species (*Bentley*).

To SPECI'FICATE. *v. a.* (from *species* and *facio*, Lat.) To mark by notation of distinguishing particularities (*Hale*).

SPECIFICA'TION. *s.* (*specification*, Fr.) 1. Distinct notation; determination by a peculiar mark (*Watts*). 2. Particular mention (*Ayliffe*).

To SPE'CIFY. *v. a.* (from *species*; *specifier*, Fr.) To mention; to show by some particular mark of distinction (*Pope*).

SPE'CIMEN. *s.* (*specimen*, Lat.) A sample; a part of any thing exhibited, that the rest may be known (*Addison*).

SPE'CIOUS. *a.* (*specieux*, Fr. *speciosus*, Latin.) 1. Showy; pleasing to the view (*Milton*). 2. Plausible; superficially; not solidly right; striking at first view (*Atterbury*).

SPE'CIOUSLY. *ad.* (from *specious.*) With fair appearance (*Hammond*).

SPECK. *s.* (ꞅpecec, Sax.) A small discoloration; a spot (*Dryden*).

To Speck. *v. a.* To spot; to stain in drops (*Milton*).

SPE'CKLE. *s.* (from *speck.*) Small speck; little spot.

To Spe'ckle. *v. a.* (from the noun.) To mark with small spots (*Milton*).

SPECKT or Speight. *s.* A woodpecker (*Ainsworth*).

SPE'CTACLE. *s.* (*spectacle*, Fr. *spectaculum*, Latin.) 1. A show; a gazing-stock; any thing exhibited to the view as eminently remarkable (*Shakspeare*). 2. Any thing perceived by the sight (*Spenser*).

Spectacles, an optic machine, consisting of two lenses set in a frame, and applied on the nose, to assist in defects of the organ of sight.

Old people, and all presbytæ, use spectacles of convex lenses, to make amends for the flatness of the eye, which does not make the rays converge enough to have them meet in the retina.

Short-sighted people, or myopes, use concave lenses, to keep the rays from converging so fast, on account of the great roundness of the eye, which is such, as to make them meet before they reach the retina.

In Spain, and at Venice especially, spectacles are used with a different view: all the people of note and fashion there have them continually on their noses; a folly, that has its source in the natural pride of those people, who value themselves on a profound wisdom; and affect to stare very near at every thing; as if their eyes were weakened, and worn out with excess of attention. Vign. de Marv. F. Cherubin, a capuchin, describes a kind of spectacle telescopes, for the viewing of remote objects with both eyes; nence called binoculi. Though F. Rheita had mentioned the same before him, in his Oculus Enoch et Eliæ. See Binocle.

The same author invented a kind of spectacles, with three or four glasses, which performed extraordinarily.

Spectacles were certainly unknown to the ancients, though it is by no means improbable that they had dioptric instruments for the same purpose. Francisco Redi, in a very learned treatise on spectacles, will have them to have been invented in the thirteenth century, between the years 1280 and 1311 (probably about the year 1299 or 1300) and adds, that Alexander de Spina, a monk of the order of Predicants of St. Catharine, at Pisa, first communicated the secret, which was of his own invention; upon learning that another person had it as well as himself. This history is written in the chronicles of that convent.

The same author tells us, that in an old manuscript still preserved in his library, composed in 1299, spectacles are mentioned as a thing invented about that time: and that a famous jacobin, one Jourdon de Rivalto, in a treatise composed in 1305, says expressly, that it was not yet twenty years since the invention of spectacles. He likewise quotes Bernard Gordon in his Lilium Medicinæ, written the same year, where he speaks of a collyrium, good to enable an old man to read without spectacles.

Muschenbroeck, Introd. vol. ii. p. 786. observes, that it is inscribed on the tomb of Salvinus Armatus, a nobleman of Florence, who died in 1317, that he was the inventor of spectacles.

Du-Cange, however, carries the invention of spectacles farther back; assuring us, that there is a Greek poem in manuscript in the French king's library, which shews, that spectacles were in use in the year 1150: nevertheless, the dictionary of the academy della Crusca, under the word occhiale, inclines to Redi's side; and quotes a passage from Jourdon's Sermons, which says, that spectacles had not been twenty years in use: and Salvati has observed, that those sermons were composed between the years 1330 and 1336.

It is probable, that the first hint of the construction and use of spectacles as they exist among the moderns was derived from the writings either of Alhazen, who lived in the twelfth century, or of our own countryman Roger Bacon, who was born in 1214, and died in 1292, or 1294.

For our own parts, however, we cannot bring ourselves to believe that the ancients were ignorant of the power of glass in magnifying objects. Indeed we have tolerably conclusive evidence of the contrary. Seneca has these words—*Poma per vitrum aspicientibus multo majora sunt*,—or, as he expresses it in another part of the same book,—*si innatant vitro*,—"apples appear *greatly magnified* to those who view them as they swim in a vessel of glass." Nat. Quæst. lib. i. cap. 6. To read small letters with any tolerable convenience, either a portion of a sphere of solid glass, or a hollow sphere of glass filled with water, must be placed between the object and the eye of the spectator. The latter of these the ancients certainly had in use, and applied them as dioptric burning glasses. That they could do this, and be ignorant of their magnifying power, would not be credible, and the contrary is plainly affirmed. Seneca observes—*Literæ quamvis minutæ et obscuræ, per vitream pilam aquâ plenam, majores clarioresque cernuntur.* "Letters, though minute and obscure, appear larger and clearer through a glass bubble filled with water." Ibid. cap. 7. No curious philosopher (and the Romans had many) could be acquainted with such a fact, and not go farther. But it is said, they could not proceed farther without grinding glass, and Dr. Hook has declared (see Smith's Optics, vol. ii. pa. 16. art. 94, of the Remarks) that they were ignorant of this. Yet this is clearly a mistake, as the evidence of Pliny will clearly prove. *Aliud flatu figuratur, aliud torno teritur, aliud argenti modo cælatur. Sidone quondam iis officinis nobili, siquidem etiam specula excogitaverat. Hæc fuit antiqua ratio vitri.* "Some glass is fashioned by blowing; some is ground upon a wheel or in a turning lathe; and some is engraved like silver. Sidon was celebrated for its glass works; having also invented specula. Such was the ancient art of glass." Nat. Hist. lib. xxxvi. cap. 26.

That glass was ground by the ancients may farther be proved from the writings of Seneca: for how could a prism of glass be made by blowing? Yet such things were in use among the virtuosi of Rome in the days of Nero. *Virgula solet fieri vitreæ—pluribus angulis—hæc si ex transverso solem accipit, colorem talem, qualis in arcu videri solet, reddit.* "A rod or bar of glass is made with several angles, which, if it receive the rays of the sun through it, makes such colours as we see in the rainbow." Nat. Quæst. lib. i. cap. 7. He also speaks of multiplying glasses, the several faces of which must have undoubtedly been cut upon a wheel. *Si apte fabricata foret, totidem redderet soles, quot habuisset insecturas.* After all this we fancy it will not be thought any very strained inference to conclude that the ancients had at least something that answered the purpose of our reading glasses.

Other traces may be found which will carry the matter back to a date much earlier than has been usually assigned to this class of inventions. Amongst the adages of Junius (published in the same volume with those of Erasmus) this short passage is extracted from Pisidas, a christian writer who flourished at Constantinople in the 7th century—*Τα μελλοντα ως δια διοπτρȣ συ βλεπεις.* "You see things future as by a dioptrum." What can this dioptrum be? Must we not understand by it either a spectacle-glass or a prospective glass? We know of no other instruments whereby things indistinct and at a distance may be seen as if they were near at hand: and this the adage obviously requires, to give it any propriety and force of application. And thus again we are brought to the same conclusion: but, however amusing the enquiry may be, we must not here pursue it farther.

Spectacles used by short-sighted persons are generally concave; as the spectacles employed by the far-sighted are convex.

The choice of spectacles being an object of great importance to all who are anxious to preserve their eyes, we shall select a few rules from Mr. Adams's valuable Essay on Vision. By a careful attention to such directions, the failure of sight may be retarded, and the eyes greatly relieved.

Those who stand in need of spectacles ought at first always to choose such as represent objects without enlarging or diminishing them; and which, on being placed near the eye, exhibit printed characters clearly and distinctly, without straining that organ. It will, therefore, in every instance, be advisable to consult the artist of whom the glasses are purchased: for, though every person must eventually determine what lenses afford him the most accurate vision, the former will thus be enabled to accommodate them to the eye of the latter, with greater certainty and advantage. Besides the fatigue of trying a variety of glasses will thus be obviated; and the purchaser will procure a pair best adapted to the structure of his eyes.—Short-sighted persons ought always to make a very gradual allowance in changing their spectacles, so as to select others which magnify a little more than the preceding pair, though somewhat less distinctly, without obscuring the object. Thus, their sight will be imperceptibly improved; and, after making use of less concave lenses, the defect of vision may, in process of time, be entirely remedied. These transitions, however, ought not to be sudden, lest the resources of art should be too early exhausted. And as it would be difficult to meet either with a pair of glasses in the shops that exactly fit both eyes, or with a person whose organs of sight are both of a size and construction perfectly equal, it rationally follows, that such important choice should be separately made, with respect to each of these useful organs.

Spectacles are generally transparent and colourless; though sometimes green lenses are preferred by those whose eyes are unable to support a vivid light. Such colour is believed to be the most soothing to the human eye, though it tends at first in some degree to darken the object. Hence, this shade will prove beneficial only to persons who possess strong but irritable eyes; yet even such individuals should not indulge in it, if light-coloured objects continue to assume a reddish tinge, after having tried the experiment for a few days. In all cases, however, spectacles ought to be employed only in writing, reading, or similar occupations that render this artificial aid necessary; and during which the eye is retained at an uniform distance.

Dr. W. H. Wollaston took out in February, 1804, a patent for what he considered a new invention in spectacles, in which each glass should be of the shape well known by the term *meniscus*, the focal distances of the concave and convex faces to be varied as circumstances rendered necessary. Mr. W. Jones the optician has disputed the utility of this invention; and has clearly proved that, whether it be useful or not, Dr. W. is not the original inventor.

SPE′CTACLED. *a.* (from the noun.) Furnished with spectacles (*Shakspeare*).

SPECTA′TION. *s.* (*spectatio*, Latin.) Regard; respect (*Harvey*).

SPECTA′TOR. *s.* (*spectateur*, Fr. *spectator*, Latin.) A looker-on; a beholder (*Sh.*).

SPECTA′TORSHIP. *s.* (from *spectator*.) Act of beholding (*Shakspeare*).

SPE′CTRE. *s.* (*spectre*, Fr. *spectrum*, Lat.) 1. Apparition; appearance of persons dead (*Stillingfleet*). 2. Something made preternaturally visible.

SPE′CTRUM. *s.* (Latin.) An image; a visible form (*Newton*).

SPE′CULAR. *a.* (*specularis*, Latin.) 1. Having the qualities of a mirror or looking-glass (*Donne*). 2. Assisting sight. Improper (*Philips*).

To SPE′CULATE. *v. n.* (*speculer*, Fr. *speculor*, Latin.) To meditate; to contemplate; to take a view of any thing with the mind (*Digby*).

To Spe′culate. *v. a.* To consider attentively; to look through with the mind (*Bro.*).

SPECULA′TION. *s.* (from *speculate*.) 1. Examination by the eye; view. 2. Examiner; spy (*Shakspeare*). 3. Mental view; intellectual examination; contemplation (*Hooker*). 4. A train of thoughts formed by meditation (*Temple*). 5. Mental scheme not reduced to practice (*Temple*). 6. Power of sight: not in use (*Shakspeare*).

Speculation, in card-playing, a sociable and talkative round game, in which many may join, using a complete pack of cards, bearing the same import as at whist, with fishes or counters, on which such a value is fixed as the company agree to; the highest trump, in each deal, wins the pool; and whenever it happens that not one is dealt, the company pool again, and the event is decided by the succeeding coup. After determining the deal, &c. the dealer pools six fishes, and every other player four; next three cards are given to each by one at a time, and another turned up for trump; the cards are not to be looked at, except in this manner,—the eldest hand shews the uppermost card, which, if a trump, the company may speculate on or bid for; the highest bidder buying and paying for it, provided the price offered is approved of by the seller. After this is settled, or if the first card do not prove trump, then the next eldest shews the uppermost card, and so on; the company speculating as they please, till all are discovered; when the possessor of the highest trump, whether by purchase or otherwise, gains the pool.

To play this game well, little more is requisite than a recollection of what superior cards of that particular suit have appeared in the preceding deals, and a consequent calculation how far the trump offered has a probability of proving the highest in the deal then undetermined.

SPE'CULATIVE. *a.* (from *speculate.*) 1. Given to speculation; contemplative (*Hooker*). 2. Theoretical; notional; ideal; not practical (*Bacon*).

SPE'CULATIVELY. *ad.* (from *speculative.*) 1. Contemplatively; with meditation. 2. Ideally; notionally; theoretically.

SPECULA'TOR. *s.* (from *speculate.*) 1. One who forms theories (*More*). 2. (*speculateur,* French.) An observer; a contemplator (*Brown*). 3. A spy; a watcher (*Broome*).

SPE'CULATORY. *a.* (from *speculate.*) Exercising speculation.

SPE'CULUM. *s.* (Latin.) A mirror; a looking-glass (*Boyle*).

SPECULUM for reflecting telescopes, is made of a kind of white copper, consisting of 32 parts of fine red copper, one of brass, 15 of grain tin, and three of white arsenic. The process given by the late J. Edwards, who was rewarded by the board of longitude for disclosing it to the public, was published in the Nautical Almanac for 1787, and is as follows: Melt the copper in a large crucible, employing some black flux, composed of two parts of tartar and one of nitre; when melted, add to it the brass and the silver. Let the pure tin be melted into another crucible, also with some black flux. Take them both from the fire, and pour the melted tin into the fused mass in the large crucible. Stir the whole well with a dry spatula of birch; and pour off the fused metal immediately into a large quantity of cold water. The sudden chill of the water will cause the fluid metal to divide into an infinite number of small particles, which will cool instantly. 2. If the copper is completely saturated, the fracture of one piece of this mixed metal will appear bright, and of a glossy look, resembling the face of pure quicksilver. But if it is a brown reddish colour, it wants a little more tin. To ascertain the required proportion, melt a small quantity, known by weight, of the mixed metal, with a known very small part of tin; and, if necessary, repeat the trial with different doses, till the fracture of the new mixture looks as already described. Having now ascertained the necessary addition of tin that is required, proceed to the last melting of the whole metal, together with the additional proportional dose of tin; fuse the whole, observing the same cautions as before, and you will find that the mixture will melt with a much less heat than that for the first fusion. Have ready as many ounces of white arsenic in coarse powder, as there are pounds in the weight of metal; wrap up the arsenic in a small paper, and put it, with a pair of tongs, into the crucible; stir it well with the spatula, retaining the breath to avoid the arsenical fumes or vapours (which, however, are not found to be hurtful to the lungs) till they disappear; take the crucible off the fire, clear away the dross from the top of the metal; pour in about one ounce of powdered rosin, with as much nitre, in order to give the metal a clean surface, and pour out the metal into the moulded flasks. 3. The speculum should be moulded with the concave surface downwards, and many small holes should be made through the sand upwards, to discharge the air. The moulding-sand from Highgate near London, used by the founders, is as good as any for casting these metallic mirrors. The cast metal should be taken out from the sand of the flasks whilst it is hot, or else it may happen to crack if left to cool within. See GRINDING, MIRROR, TELESCOPE, &c.

SPECULUM OCULI. (from *specio,* to view.) An instrument used by oculists to keep the eyelids open and the eye fixed.

SPECULUM ORIS. An instrument to force open the mouth.

SPECULUM VENERIS. See MILLEFOLIUM.

SPED. The pret. and part. pass. of *speed.*

SPEECH. *s.* (from *speak.*) 1. The power of articulate utterance; the power of expressing thoughts by words, or vocal sounds (*Watts*). 2. Language; words considered as expressing thoughts (*Milton*). 3. Particular language as distinct from others (*Com. Prayer*). 4. Any thing spoken (*Shakspeare*). 5. Talk; mention (*Bacon*). 6. Oration; harangue (*Swift*). 7. Declaration of thoughts (*Milton*).

SPEE'CHLESS. *a.* (from *speech.*) 1. Deprived of the power of speaking; made mute or dumb (*Raleigh*). 2. Mute; dumb (*Shakspeare*).

To **SPEED.** *v. n.* pret. and part. passive *sped* and *speeded.* (*spoeden,* Dutch.) 1. To make haste; to move with celerity (*Philips*). 2. (ſpeðian, to grow rich, Saxon.) To have good success (*Shakspeare*). 3. To succeed well or ill (*South*). 4. To have any condition, good or bad (*Waller*).

To **SPEED.** *v. n.* 1. To dispatch in haste; to send away quickly (*Fairfax*). 2. To hasten; to put into quick motion (*Shakspeare*). 3. To furnish in haste. 4. To dispatch; to destroy; to kill; to mischief; to ruin (*Pope*). 5. To execute; to dispatch (*Ayliffe*). 6. To assist; to help forward (*Dryden*). 7. To make prosperous (*St. Paul*).

SPEED. *s.* (*spoed,* Dutch.) 1. Quickness; celerity (*More*). 2. Haste; hurry; dispatch (*Decay of Piety*). 3. The course or pace of a horse (*Shaks.*). 4. Success; event (*Shaks.*).

SPEED (John), an English historian and antiquary, was born at Farrington, in Cheshire, about 1555. He was bred a taylor, but sir Fulk Greville, it is said, put him in the way to pursue his studies. In 1596 he published his Theatre of Great Britain, and in 1614, The History of Great Britain, from Julius Cæsar to king James I. He was also author of a work in 8vo. called The Cloud of Witnesses, or the Genealogies of Scripture, confirming the Truth of Holy History, and Humanity of Christ. He died in 1629, having survived his wife only one year. With her he had lived happily in the married state 57 years; and by her he had 12 sons and six daughters.

SPE′EDILY. *ad.* (from *speedy.*) With haste; quickly (*Dryden*).

SPE′EDINESS. *s.* (from *speedy.*) The quality of being speedy.

SPEEDWELL, in botany. See VERONICA.

SPE′EDY. *a.* (from *speed.*) Quick; swift; nimble; quick of dispatch (*Dryden*).

SPEIGHTS TOWN, a seaport of Barbadoes, formerly much frequented by the Bristol traders, and thence called Little Bristol. It is situate on the N.W. coast of the island. Lon. 58. 31 W. Lat. 13. 15 N.

SPELL. *s.* (ꞅpel, Saxon, a word.) 1. A charm consisting of some words of occult power (*Milton*). 2. A turn of work (*Carew*).

To SPELL. *v. a.* pret. and part. passive *spelled* or *spelt.* (*spellen*, Dutch.) 1. To write with the proper letters (*Dryden*). 2. To read by naming letters singly (*Shakspeare*). 3. To charm (*Dryden*).

To SPELL. *v. n.* 1. To form words of letters (*Locke*). 2. To read (*Milton*). 3. To read unskilfully (*South*).

SPELMAN (Sir Henry), a learned English antiquary and historian, born in Norfolk, about 1561. He was sent by king James three several times into Ireland upon public business; and at home was appointed one of the commissioners to enquire into the oppression of exacted fees, in all the courts and offices of England, as well ecclesiastical as civil, in which he rendered such service, that government gratefully expressed the obligation by a present, and James I. conferred on him the honour of knighthood. In 1613 he published his De non temerandis ecclesiis: and in 1626 the first part of his Glossary. The next work which he undertook was an edition of the English Councils, in which he was encouraged by archbishops Abbot, Laud, and Usher. The first volume was published in 1639, but the second not till after his death, which happened in London in 1641. Sir Henry wrote several other works, all relating to ancient laws and customs.

SPELMAN (sir John), eldest son of the preceding, a very learned man, who had great encouragement and assurance of favour from Charles I. who knighted him, and presented him with the mastership of Sutton's hospital: and after the civil war broke out often called him to his private council. He was author of several works. He died in 1643.

SPELMAN (Clement), youngest son of sir Henry, was bred to the law, and became puisne baron of the exchequer upon the restoration of Charles II. He published some pieces relating to the government, and a large preface to his father's book De non temerandis ecclesiis. He died in 1679. (*Watkins.*)

SPELLO, a town of Italy, in Umbria. Here are the ruins of a theatre, and other remains of antiquity. It is seated on a hill, three miles N.W. of Foligni, and 13 N. of Spoletto. Lon. 12. 24 E. Lat. 42. 50 N.

To SPELT. *v. n.* To split; to break.

SPELTER. See ZINCUM.

SPENCE (Joseph), an elegant writer, was a fellow of New college, Oxford, where he took the degree of M.A. in 1727; and in that year became first known to the learned world by An Essay on Pope's Odyssey, in which some particular beauties and blemishes of that work are considered, in two parts, 12mo. With this criticism Pope was so little offended that he sought the acquaintance of the writer, who lived with him from that time in great familiarity, attended him in his last hours, and compiled memorials of his conversation. The regard of Pope recommended him to the great and powerful, and he obtained very valuable preferments in the church. In June 1742 he succeeded Dr. Holmes as his majesty's professor of modern history, at Oxford; and in 1754 was installed prebend of Durham. In 1747 he published his Polymetes, or an Enquiry concerning the Agreement between the Works of the Roman Poets, and the Remains of the Ancient Artists, being an attempt to illustrate them mutually from each other. He was author of several other ingenious works. Mr. Spence was unfortunately drowned in a canal in his garden, at Byfleet, in Surry, in 1768.

SPENCER (Dr. John), a very learned divine, was born in Kent, in 1630, and educated at Corpus Christi college, Cambridge, where he proceeded through all his degrees, and of which college he was chosen master. In 1667 he was preferred to the deanry of Ely. He died in May, 1695. His greatest works are, 1. De Legibus Hebræorum Ritualibus & earum Rationibus, 1685. 2. A Discourse concerning Prodigies, with another concerning Vulgar Prophecies, 8vo. 1665.

SPENCER (William), fellow of Trinity college, in Cambridge, a learned man, who published at the university press, in 1658, the eight books against Celsus and Philocalia of Origen, with a corrected Latin version, and notes of his own, in 4to.

To SPEND. *v. a.* (ꞅpenꝺan, Saxon.) 1. To consume; to exhaust; to waste (*Milt.*). 2. To bestow, as expence; to expend, as cost (*Isaiah*). 3. To bestow for any purpose (*Boyle*). 4. To effuse (*Shakspeare*). 5. To squander; to lavish (*Wake*). 6. To pass; to suffer to pass away (*Job*). 7. To waste; to wear out (*Burnet*). 8. To fatigue; to harass (*Addison*).

To SPEND. *v. n.* 1. To make expence (*South*). 2. To prove in the use: as, *pork fed with pease* spends *well* (*Temple*). 3. To be lost or wasted: as, *life* spends *in trifles* (*Bacon*). 4. To be employed to any use (*Bacon*).

SPE′NDER. *s.* (from *spend.*) 1. One who spends (*Taylor*). 2. A prodigal; a lavisher (*Bacon*).

SPE′NDTHRIFT. *s.* (*spend* and *thrift.*) A prodigal; a lavisher (*Swift*).

SPENSER (Edmund), an English poet of the 16th century, was born at London, and educated in Pembroke-hall, Cambridge, where he took the degree of master of arts in 1576; but at length standing for a fellowship without success, this disappointment, together with the narrowness of his circumstances, forced him from the university; and we find him next taking up his residence with some friends in the north, where he fell in love with his Rosalind, whom he so finely celebrates in his Pastorals, and of whose cruelty he has written such pathetic complaints. The Shepherd's Calendar, which is so full of his unprosperous passion for Rosalind, was the first of his works of any note, and this he addressed by a short dedication in verse to sir Philip Sidney, concealing himself under the humble title of Immerito. After he had staid some time in the north, he was prevailed upon by some friends to quit his obscurity, and come to London, that he might be in the way of promotion. The first step he made towards preferment was his acquaintance with sir Philip Sidney, who was then in the highest reputation for his wit and polite accomplishments. Though nothing could have been more happy for Mr. Spenser than his being introduced to court by sir Philip, yet he did not immediately receive any great benefit from it. He was indeed created poet laureat to queen Elizabeth, but for some time only wore a barren laurel, and possessed the place without the pension. The lord treasurer Burleigh had no taste for Spenser's merit, and is said to have intercepted the queen's favour to him. Fuller, in his Worthies, observes, that her majesty, upon Spenser's presenting some poems to her, ordered him a gratuity of an hundred pounds; but the lord treasurer objecting to it, said with some scorn of the poet, "What! all this for a song?" To which the queen replied, "Then give him what is reason." Spenser waited for some time, but had the mortification to find himself disappointed of the queen's bounty. Upon this he took a proper opportunity to present a paper to her majesty, in the manner of a petition, in which he reminded her of the order she had given in the following lines:

> I was promis'd on a time,
> To have reason for my rhyme;
> From that time unto this season,
> I receiv'd nor rhime nor reason.

This paper had, however, the desired effect, for the queen reproved the treasurer, and immediately directed the payment of the hundred pounds she had at first ordered.

We find Spenser, some time after his appearance at court, in considerable esteem with the most eminent men of that time. In 1579, he was sent abroad by the earl of Leicester, but in what service he was employed is uncertain. He was afterwards recommended as secretary to the lord Grey of Wilton, on that nobleman's being appointed lord deputy of Ireland; and he was at length rewarded by a grant from queen Elizabeth of three thousand acres of land in the county of Cork.

In this retirement he finished his Fairy Queen, and here he was a more successful lover than when he courted his Rosalind, for the collection of his sonnets are a kind of short history of the progress of a new amour, which we find ended in marriage, and gave occasion to an excellent Epithalamium, which no one could write so well as himself. Here he was visited by sir Walter Ralegh in his return from the Portugal expedition in 1589, who persuaded him to return to England, and introduced him to the queen; but in the Irish rebellion under the earl of Desmond, our author was plundered and deprived of his estate, and seems to have spent the latter part of his life with much grief of heart, under the disappointment of a broken fortune. He died in 1598, and was interred in Westminster Abbey. Besides his works already mentioned, he wrote a poem called Mother Hubberd's Tale, Hymns, Daphnaida, and Elegies on sir Philip Sidney. He wrote likewise nine comedies, in imitation of the admired Ariosto, which are inscribed with the names of the nine Muses, but are unhappily lost.

Spenser's whole works, with his life by Hughes, were published in 6 vols. 12mo. in 1715 and 1750.

SPERGULA. Corn-spurrey. In botany, a genus of the class decandria, order pentagynia. Calyx five-leaved; petals five, undivided; capsule superior, ovate, one-celled, five-valved. Seven species; four common to the corn-fields, moist sands, and wet mountains of our own country. The chief is S. arvensis, common corn-spurrey, with leaves in whorls; fruit reflected; seeds kidney-form; flowers small, white, terminal. In Holland it is cultivated, on unthrifty soils, where it will grow, as food for cattle. Poultry are fond of the seeds; which in Finland and Norway are had recourse to for bread, when the common grain fails.

SPERM. *s.* (*sperme*, French; *sperma*, Latin.) Seed; that by which the species is continued (*Bacon*).

SPERMACETI. (*spermatis-ceti*, from σπερμα, seed, *a* σπειρω, to sow, and *cete* or *cetus*, the whale.) An oily, concrete, crystalline, semi-transparent matter, obtained from the cavity of the cranium of several species of whales. It was formerly very highly esteemed, and many virtues were attributed to it; but it is now chiefly employed in affections of the lungs, primæ viæ, kidneys, &c. as a softening remedy, mixed with mucilages. It is also employed by surgeons as an emollient in form of cerates, ointments, &c. The species of whale in which this material is found in the largest abundance is the physeter macrosephalus, or cachalot (see PHYSETER), and hence called spermaceti whale. But though spermaceti is found among these animals in the cavity of the scull, it appears to be entirely different from the proper brain. When first extracted it is mixed with a considerable quantity of oil, which is separated by putting the mass into a woollen bag and pressing it; by which the greatest part of the oil runs out, and then washing the residue with a warm weak alkaline ley, which dissolves and converts into soap the remainder of the oil, leaving behind the spermaceti untouched. This latter, after being repeatedly washed with soft water, is melted by a very gentle heat, the impurities partly float on the surface, and partly sink to the bottom, and are thus got rid of; the fluid, in appearance, a perfectly pellucid oil, is now allowed to cool, and forms on congealing a mass of spermaceti.

The colour of spermaceti is a pure, brilliant, almost silvery white; it is composed of semi-transparent crystalline plates; is softer and more brittle than white wax; has very little flavour, and only a sight tallowy odour. Its point of congelation is 112 Fahr. By the assistance of a wick, it burns with a clear white flame, superior to that of tallow, and without any disagreeable odour; and is hence very generally employed for candles.

By distillation at a gentle heat spermaceti passes over in the state of a fluid oil, which concretes on cooling, a very slight carbonaceous residue being left in the retort. By repeated distillation, however, the spermaceti becomes permanently fluid at the common temperature. It requires, according to Theuvenel, a much less heat for its volatilization than most of the other oils do, and therefore is less decomposed by the process; in particular, no acid makes its appearance. But, according to Crell's experiments, a greater heat is required for its distillation than for that of fat, the coagulated oil thus procured being partly white and partly brownish: by repeated distillation it affords a yellowish acid, becomes more fluid, but still coagulates in the cold. The acid, when rectified by distillation, is entirely colourless, and affords the same salts with earths and alkalies as Crell's sebacic acid. The oil unites with ammonia into a saponaceous emulsion.

Spermaceti is soluble in boiling alkohol, though very sparingly, 150 parts of the menstruum being required for this purpose; while the whole of the spermaceti appears to be reprecipitated as the solution cools. Warm ether dissolves it very copiously, but seems to retain none of it when cold. It dissolves sulphur as other fat oils do. By long exposure to the air it acquires a yellow tinge, and becomes rancid.

SPERMACOCE. Button-weed. Corol one-petalled, funnel-form; seeds two, bidentate. Twenty species; natives of the East or West Indies or of America. The two following are cultivated:

1. S. tenuior. Slender button-weed. Grows to the height of two and a half feet; branches in pairs; flowers in slender whorls towards the top of the stalks small, white and sessile. A native of Carolina and the West Indies.

2. S. verticillata. Whorl-flowered button-weed. Stem shrubby, three or four feet high, sending out a few slender branches; flowers in thick globular whorls towards the top, small and white. A native of Jamaica.

These are both increased by sowing the seeds on a moderate hot-bed in the spring, or in pots plunged into the bed. They require afterwards to be managed as exotics of the stove-kind.

SPERMA'TICAL. Sperma'tic. *a.* (*spermatique*, French, from *sperm.*) 1. Seminal; consisting of seed (*More*). 2. Belonging to the sperm (*Ray*).

To SPE'RMATIZE. *v. n.* (from *sperm.*) To yield seed (*Brown*).

SPERMATOCELE. (σπερματοκηλη, from σπερμα, seed, and κηλη, a tumor.) In surgery, a swelling of the testicle or epididymis from an accumulation of semen. It is known by a swelling of those organs, and from pain extending to the loins without inflammation.

SPERMODERMIA, in botany, a genus of the class cryptogamia, order fungi. Fungus quite simple, globular, sessile, spongy; seeds crowned, supplying the place of a bark. One species only, an exotic plant.

SPERMO'LOGIST. *s.* (σπερμολογος.) One who gathers or treats of seeds.

To SPERSE. *v. a.* (*sparsus*, Latin.) To disperse; to scatter: not in use (*Spenser*).

To SPET. *v. a.* To bring or pour abundantly (*Milton*).

SPEUSIPPUS, an Athenian philosopher, nephew, as also successor of Plato. He presided in Plato's school for eight years, and disgraced himself by his extravagance and debauchery. He died eaten of lice, or killed himself according to some accounts, B. C. 339. He adhered very strictly to the doctrine of his master.

To SPEW. *v. a.* (ꞅpepan, Saxon, *speuwen*, Dutch.) 1. To vomit; to eject from the stomach (*Spenser*). 2. To eject; to cast forth (*Dryden*). 3. To eject with loathing (*Bacon*).

To Spew. *v. n.* To vomit; to ease the stomach (*Ben Jonson*).

SPE'WY. *a.* (from *spew.*) Wet; foggy (*Mortimer*).

SPEZZIA, or Spetia, a town of Italy, in the territory of Genoa, with a good harbour. It is seated at the foot of a hill, at the bottom of a gulf of the same name, 47 miles S.E. of Genoa, and 65 N.W. of Florence. Lon. 9. 37 E. Lat. 44. 10 N.

To SPHA'CELATE. *v. a.* To affect with a gangrene (*Sharp*).

To Spha'celate. *v. n.* To mortify; to suffer the gangrene (*Sharp*).

SPHA'CELUS. (σφακελος, from σφαζω, to destroy.) A mortification of any part. See Gangrene.

SPHÆNOID BONE. (*os sphenoides*, from σφεν, a wedge, and ειδος, a likeness; because it is fixed in the cranium like a wedge.) Os cuneiforme, os multiforme. Pterygoid bone. The os sphenoides, or cuneiforme as it is called from its wedge-like situation amidst the other bones of the head, is of a more irregular figure than any other bone. It has been compared to a bat with its wings extended. This resemblance is but faint, but it would be difficult perhaps to find any thing it resembles more.

We distinguish in this bone its body or middle part, and its wings or sides, which are much more extensive than its body.

Each of its wings or lateral processes is divided into two parts. Of these the uppermost and most considerable portion, helping to form the deepest part of the temporal fossa on each side, is called the temporal process. The other portion makes a part of the orbit, and is therefore named the orbitar process. The back part of each wing from its running out sharp to meet the os petrosum, has been called the spinous process; and the two processes, which stand out almost perpendicular to the basis of the scull, have been named pterygoid or aliform processes, though they may be said rather to resemble the legs than the wings of the bat. Each of these processes has two plates and a middle fossa facing backwards; of these plates the external one is the broadest, and the internal one the longest. The lower end of the internal plate forms a kind of hook, over which passes the round tendon of the musculus circumflexus palati. Besides these, we observe a sharp middle ridge, which stands out from the middle of the bone. The fore part of it, where it joins the nasal lamella of the ethmoidal bone, is thin and straight; the lower part of it is thicker, and is received into the vomer.

The cavities observable on the external surface of the bone are where it helps to form the temporal, nasal, and orbitar fossæ. It has likewise two fossæ in its pterygoid processes. Behind the edge, which separates these two fossæ, we observe a small groove, made by a branch of the superior maxillary nerve in its passage to the temporal muscle. Besides these, it has other depressions, which serve chiefly for the origin of muscles.

Its foramina are four on each side. The three first serve for the passage of the optic, superior maxillary, and inferior maxillary nerves; the fourth transmits the largest artery of the dura mater. On each side we observe a considerable fissure, which, from its situation, may be called the superior orbitar fissure. Through it pass the third and fourth pair of nerves, a branch of the fifth, and likewise the sixth pair. Lastly, at the basis of each pterygoid process, we observe a foramen which is named pterygoidean and sometimes Vidian, from Vidius who first described it. Through it passes a branch of the external carotid, to be distributed to the nose.

The os sphenoides on its internal surface affords three fossæ. Two of these are considerable ones; they are formed by the lateral processes, and make part of the lesser fossæ of the basis of the skull. The third, which is smaller, is on the top of the body of the bone, and is called sella turcica, from its resemblance to a Turkish saddle. In this fossa the pituitary gland is placed. At each of its four angles is a process. They are called the clinoid processes, and are distinguished by their situation into anterior and posterior processes. The two latter are frequently united into one.

Within the substance of the os sphenoides, immediately under the sella turcica, we find two cavities, separated by a thin bony lamella. These are the sphenoidal sinuses. They are lined with the pituitary membrane, and, like the frontal sinuses, separate a mucus which passes into the nostrils. In some subjects there is only one cavity; in others, though more rarely, we find three.

In infants the os sphenoides is composed of three pieces, one of which forms the body of the bone and its pterygoid processes, and the other two its lateral processes. The clinoid processes may even then be perceived in a cartilaginous state, though some writers have asserted the contrary; but we observe no appearance of any sinus.

This bone is connected with all the bones of the cranium, and likewise with the ossa maxillaria, ossa malarum, ossa palati, and vomer. Its uses may be collected from the description we have given of it.

SPHÆNOIDAL SUTURE. Sutura sphænoidalis. The sphænoidal and ethmoidal sutures are those which surround the many irregular processes of these two bones, and join them to each other and to the rest.

SPHÆNO-SALPINGO-STAPHILINUS. See CIRCUMFLEXUS.

SPHÆNO-STAPHILINUS. See LEVATOR PALATI.

SPHÆRANTHUS. Globe-flower. In botany, a genus of the class syngenesia, order polygamia segregata. Calycle eight-flowered; florets tubular, hermaphrodite and indistinct female; receptacle scaly; downless. Six species; natives of India, Cochinchina, and the Cape.

SPHÆRIA, in botany, a genus of the class cryptogamia, order fungi. Cases filled with roundish, naked, gelatinous seeds. Twenty-three species, thus subdivided:

A. Simple: cases naked, solitary, or clustered.

B. Simple: cases imbedded, distinct, or cohering.

C. Compound: cases several, imbedded.

These are natives of Europe, and all of them indigenous to our own country; being found parasitically on cabbage-stumps, the beech-tree, ash, and various others.

SPHÆRIDIUM, in the entomology of Fabricius, a tribe of the coleopterous genus SILPHA, which see.

SPHÆRISTERIUM. (σφαιριϛεριον.) In antiquity, the seventh part of the ancient gymnasium; being that wherein the youth practised tennis-playing.

The sphæristerium, or tennis-court, was between the place named palæstra, and that where they ran races, which was between the porticoes and the outer wall, though Vitruvius does not make mention of it in the description he gives of the ancient gymnasium.

The exercise here performed was called σφαιριϛικη, sphæristica, which some suppose to have differed from the modern tennis; but it is not known wherein the difference consisted.

SPHÆROBOLUS, in botany, a genus of the class cryptogamia, order fungi. Fungus sessile, globular-concave, with a radiate or entire mouth, and ejecting a globular capsule. Two species only, both common to our own country.

SPHÆROCARPUS, in botany, a genus of the class cryptogamia, order hepaticæ. Calyx inflated, perforated at top: seeds very numerous, collected into a globe. One species only: common to our own country.

SPHÆROMACHIA. (σφαιρομαχια.) In antiquity, a particular kind of boxing, wherein the combatants had balls of stone or lead in their hands, which were called σφαιραι.

SPHAGNUM. Bog-moss. In botany, a genus of the class cryptogamia, order musci. Capsule with the mouth naked, vail cut round, its base remaining on the lower part of the capsule. Seven species: four common to our own country; three exotics. The common bog-moss grows on our bogs in wide patches, so as frequently to cover a large portion of their surface. The stalks are from two inches to two feet, irregularly surrounded with numerous conical pendant branches, and terminated with a rotaceous cluster of erect short ones. The Lapland matrons dry and lay up this moss in their cradles to supply the place of bed, bolster, and bed-coverings; and being changed night and morning, it keeps the infant clean, dry, and warm. It is sufficiently soft of itself; but the tender mother, not satisfied with this, covers the moss with the downy hairs of the rein-deer; and thus provides a most delicate nest for the babe.

Several of these species have a peculiar power of preserving their vegetation for months and perhaps years, when packed up in boxes, or suspended in the atmosphere, from which, like the epidendrum flos aeris, it is probable that it continues to derive a considerable portion of its nutriment.

In consequence of this extraordinary faculty it has lately been employed by Mr. Salisbury, of Brompton, as a material for packing other plants, and keeping their roots moist during a long voyage, and that with a success that promises to be of the utmost importance. The history of this curious and valuable fact is too interesting for us to suppress, and we shall therefore copy it from Mr. Salisbury's own account as communicated to the Society for the Encouragement of Arts and Commerce.

"Much still remains to be accomplished by the assiduous botanist; for instance, neither the plants producing the cinchona, or which nourish the cochineal, have yet reached our soil, nor are we even acquainted with those which yield many of our most useful drugs. This is owing, in a great measure, to the difficulty of procuring perfect seeds, it being a well known fact, that many kinds will not vegetate, if left dry but a short time after gathering; and the difficulty of keeping plants alive during long voyages has been almost an insuperable obstacle. Impressed, therefore, with the importance of the subject, I wrote to you on the 9th of January last, and have now the pleasure of communicating to the Society of Arts, &c. for the benefit of the public, farther particulars of the mode I have discovered; and by which I am convinced, from actual experiments, trees or plants of all kinds may, with ease and certainty, be transported from any part of the globe to this country and our colonies; being confident, that our commerce will be improved by a more certain mode of exporting the numerous fruits with which our nurseries exclusively abound.

"I had, some time ago, an opportunity of viewing a large heap of moss (sphagnum palustre, Linn.) which had been collected for decorating a grotto. I observed, that, although it had lain exposed for several months in the heat of summer, yet, with the exception of the very outside of the heap, its particles appeared in the same state as when first collected, and that a gentle state of vegetation was still going on. I moreover observed, that several species of heaths, grasses, and plants, that had been by chance collected in the heap, were preserved; and in several instances had the same appearances as when growing; others were a little blanched for want of light; but even these were alive, and capable of growing by proper management. These circumstances led me to make some experiments to ascertain how long trees of different kinds might be preserved in this substance, when excluded from the external air; and I so far succeeded, as to keep them for six months, part of which time had been extreme hot weather, and I had afterward the pleasure of getting them to grow in my garden equal to any that had been transplanted the same season.

"As I have endeavoured to discover what property this particular moss possesses, when compared with others generally used for packing plants, I shall remark, that, as its name implies, it is in a great measure an aquatic, and consequently not liable to injury from moisture, which it has the power of retaining in a wonderful degree, while all the species of hypnum cannot be prevented from rotting, unless they are kept perfectly dry; and although the mosses in general, when moistened with water, are useful to wrap round the roots of trees when packed up, yet they gradually undergo a decomposition; and consequently, if plants were completely enveloped therein, they would decay in time from the same cause, which I have proved in many instances.

"I was therefore led to ascribe the advantages, which the sphagnum palustre possesses, to its property of holding water, and resisting fermentation; and I am confirmed in this opinion, by a letter, which I have received from my worthy friend Mr. A. T. Thompson, to whom I had submitted some of that moss, for a chemical analysis.

"The manner in which I have been accustomed to pack up plants is as follows. When the moss is collected from the bogs in which it grows, it should be pressed, in order to drain out as much moisture as possible, and having boxes prepared of sufficient sizes for the young trees (which may in some instances be shortened in their branches), I lay in the bottom of the box as much moss as will, when pressed with the foot, remain of the thickness of four inches. A layer of the plants should then be put thereon, observing that the shoots of each other do not touch, and that the space of four inches be left round the sides; after this, another layer of moss, about two inches thick, is placed, and then more plants; and I thus proceed, till after the whole of the plants are pressed down as tight as possible, and the box filled within four inches of the top, which space must be filled with the moss: the contents are then trodden down with the foot, and the box nailed closely up.

"When trees are intended to be sent to distant countries I should advise such to be selected as are small and healthy; and when arrived at their place of destination they should be cut down quite close, even to the second or third eye from the graft, or, in trees not grafted, as near the former year's wood as possible; and having prepared beds according to the following mode, let them be planted therein, to serve as a nursery; for trees of every description suffer so much from removal, that, unless the weather is particularly favourable, they do not recover it for some time, even when only transplanted in their native climate. I do not think it advisable, therefore, to plant them at once, where they are liable to suffer from want of water, and other attentions necessary to their perfect growth. I therefore recommend beds to be thus prepared for them, viz. On some level spot of ground, mark out beds five feet wide, and leave walks or alleys between them, of two feet wide, throwing a portion of the earth out of the beds upon the alleys, so as to leave them four inches higher than the beds.

"If the ground is shallow, and the under stratum not fit for the growth of trees, the whole should be removed, and the beds made good with a better soil.

"The advantage arising from planting trees in this way is, that, the beds being lower than the walks, the water which is poured on, for support of the trees, is prevented from running off. The plants are also less exposed to the influence of the winds; and, if a dry and hot season should immediately follow after they are planted, hoops covered with mats, straw, or canvas, may be placed over them, to prevent the sun from burning the plants, and to hinder a too speedy evaporation of moisture.

"In warm climates, canvas cloth will answer best for these shades, to be fixed during the heat of the day, so as to prevent the surface of the mould from becoming dry; and if a little water be sprinkled upon the canvas, once or twice during the day, it will keep it tight, and produce a moist atmosphere underneath, which will greatly facilitate the growth of the plants.

"These shades should be removed at the setting of the sun, and the plants then watered, when they will also receive the benefit of the dews during the night. In the morning the shades should be replaced, and the plants thus protected till they can stand the open air, to which they should gradually be inured by removing the shades daily more and more, till they can be wholly taken away.

"The plants should be planted in rows across the beds, about three inches distance from each other, and the rows should be about nine inches apart; and when the plants have grown thus for one year, they may be removed to the places where they are intended to remain."

The following is Mr. Thompson's account of the chemical properties of the sphagnum.

"The analysis of the moss, which you put into my hands, has afforded the following result.

"A portion of it macerated in boiling distilled water, for twenty-eight hours, yielded a pale straw-coloured, slightly mucilaginous infusion, which was nearly insipid, and of a disagreeable odour.

"The infusion of litmus was reddened when added to it. With the nitrate and acetite of barites, insoluble precipitates were thrown down, as was also the case with the acetite of lead. Sulphate of iron gave a very slight olive tinge to the infusion, after standing eight hours; and with the solution of gelatine a small quantity of a whitish flocculent precipitate was formed, after standing twelve hours. The oxalic acid, a solution of pure ammonia, and the nitrate of silver, produced no effect on the infusion.

"The conclusion to be drawn from these results is, that the moss contains in its composition, beside the ordinary principles of vegetables, a very small portion of gallic acid, and of tannin, some sulphuric acid in an uncombined state, mucilage, and extractive matter. No inference can, therefore, be drawn from these results, which explains in any degree the effects of the moss in preserving the vegetables that are enveloped in it; nor is there any effect produced in the air by it, more than is produced by mosses in general, when in an uncorrupted state; other causes to explain the preservative property of the moss must therefore be looked for, and these are to be found, in my opinion, in the peculiar qualities of the moss, connected with its own existence as a living plant.

"Plants which are taken from the earth, and packed up to be sent abroad, or to any distance so considerable as to keep them for some length of time in the package, will not vegetate when again taken out of it and planted, unless some degree of vitality has been preserved during the period that they have been out of the ground.

"To preserve this, four circumstances are essential in the packing material; softness, in order that the delicate parts of the enveloped vegetable be not injured; looseness, that a certain portion of air be contained in it, and that an equal temperature may be preserved; moisture; and the power of resisting fermentation, and the putrefactive process. All of these circumstances this moss possesses in a remarkable degree; its power of absorbing and retaining moisture is more considerable than that which perhaps any other moss possesses, it is light, soft, and loose in its texture, and its vitality is so considerable, as to carry on the powers of vegetation, and consequently to enable it to resist fermentation and putrefaction for a very great length of time.

“ Placed under such circumstances, the plants, which are packed up in the moss, enjoy a kind of life in some degree similar to that enjoyed by an animal in a torpid state, the functions of life are supported at a very low state, but still sufficient to preserve them in a situation to be acted upon by favourable circumstances, when again planted. Such is the theory I have formed of the effect of this moss in preserving plants; the many necessary calls of my profession have not allowed me time sufficient to investigate the subject with all the attention I could have wished to have bestowed on it, and must also plead my apology for the hasty manner in which my opinion is presented to you. I consider the discovery of much value, both to botany and agriculture."

Mr. Salisbury accompanied the notice of his new and valuable mode of preservation to the Society of Arts with a box containing specimens of tulip trees and liquid amber trees, “ which," says he, “ were packed up close from September, 1807, till March, 1808: they were then planted in my nursery; and the whole, amounting to several hundreds, have grown equally as well as they would have done, if only transplanted from one part to another of the same ground.

“ In February last," he continues, “ I sent to Boston in New England two packages in this way, each containing upwards of nine hundred trees of different kinds; and I have lately received the pleasing intelligence, that they have all arrived safe and done well, but that some fruit trees sent to the same gentleman, packed in the usual way, were all spoiled, owing to the heat of the hold of the vessel, in which all the packages were placed."

And in a subsequent communication he observes, “ In addition to the account which I delivered to you, respecting my method of packing plants for exportation in the sphagnum palustre moss, I beg leave to observe, that, at the time the case was packed up, which I sent to the Adelphi in January last, a similar package was sent from me to Sierra Leone, by desire of the African Institution, who wished to introduce into that colony the mulberry tree for feeding silk worms; also different kinds of vines, and other fruit trees, amounting in the whole to nearly fifteen hundred trees.

“ They arrived there in about four months after the package was made up, and the trees were planted under the direction of a gentleman, to whom I gave a copy of the instructions, which accompanied my former letter to you of last January. The following account of them has since appeared in the African Herald. ‘ A number of fruit and other trees, among which are the white and red mulberry, vines, &c. have been sent from London, by order of the African Institution; all of which are at present growing here, in a very flourishing state; and a piece of ground is clearing in the mountains, to which they are intended to be removed the next season.’

“ I requested the gentleman, to whose management the plants were entrusted, to acquaint me how they succeeded, and to use the same moss in packing up for me some of the wild plants of that neighbourhood, which he did in June last; and at the same time I received a letter from Mr. Macaulay of that place, with the following intelligence. ‘ The plants which were bought of you, and sent out by the African Institution, all thrive very well, except the tea tree, sour sop, and a few others. The mulberries, &c. grow most luxuriantly; most of the trees have been removed to a more temperate situation, about three miles hence, where the remainder will soon also be planted.’

“ This letter arrived by the Derwent, captain Colombine, who also brought me a box of plants packed up in the moss, which had been previously sent with the above; and although the package did not arrive at Brompton before the 5th of October last, the plants were in a fine state of vegetation, and are now growing in my hot-house; and even the moss itself had preserved its vegetative state, and was perfect.

“ I have been thus particular in my description of the fact, as it is a corroborating proof of the utility of this moss for such purposes; and as the removal of trees cannot be otherwise effected in long voyages, without great expense and inconvenience."

SPHENE, in mineralogy, a species of the genus TITANIUM, which see.

SPHENOCLEA, in botany, a genus of the class pentandria, order monogynia. Corol five-cleft, less than the calyx; capsule two-celled, compressed, opening transversely all round; stigma capitate, permanent. One species only, s. zeylanica, a native of Malabar and Ceylon.

SPHENOIDES (Os). See SPHÆNOID BONE.

SPHERE. *s.* (*sphæra*, Latin.) 1. A globe; an orbicular body; a body of which the centre is at the same distance from every point of the circumference (*Milton*). 2. Any globe of the mundane system (*Dryden*). 3. A globe representing the earth or sky (*Dryden*). 4. Orb; circuit of motion (*Milton*). 5. Province; compass of knowledge or action; employment (*Shakspeare*).

To SPHERE. *v. a.* (from the noun). 1. To place in a sphere (*Shakspeare*). 2. To form into roundness (*Milton*).

SPHERE, is a solid contained under one uniform round surface, such as would be formed by the revolution of a circle about a diameter thereof as an axis. See GEOMETRY.

Properties of the Sphere are as follow:

1. A sphere may be considered as made up of an infinite number of pyramids, whose common altitude is equal to the radius of the sphere,

and all their bases form the surface of the sphere. And therefore the solid content of the sphere is equal to that of a pyramid whose altitude is the radius, and its base is equal to the surface of the sphere, that is, the solid content is equal to $\frac{1}{3}$ of the product of its radius and surface.

2. A sphere is equal to $\frac{2}{3}$ of its circumscribing cylinder, or of the cylinder of the same height and diameter, and therefore equal to the cube of the diameter multiplied by .5236, or $\frac{2}{3}$ of .7854; or equal to double a cone of the same base and height. Hence also different spheres are to one another as the cubes of their diameters, and their surfaces as the squares of the same diameters.

3. The surface or superficies of any sphere is equal to four times the area of its great circle, or of a circle of the same diameter as the sphere. Or,

4. The surface of the whole sphere is equal to the area of a circle whose radius is equal to the diameter of the sphere. And, in like manner, the curve surface of any segment, whether greater or less than a hemisphere, is equal to a circle whose radius is the chord line drawn from the vertex of the segment to the circumference of its base, or the chord of half its arc.

5. The curve surface of any segment or zone of a sphere is also equal to the curve surface of a cylinder of the same height with that portion, and of the same diameter with the sphere. Also the surface of the whole sphere, or of a hemisphere, is equal to the curve surface of its circumscribing cylinder. And the curve surfaces of their corresponding parts are equal, that are contained between any two places parallel to the base. And consequently the surface of any segment or zone of a sphere is as its height or altitude.

Most of these properties are contained in Archimedes's treatise on the sphere and cylinder. And many other rules for the surfaces and solidities of spheres, their segments, zones, frustums, &c. may be seen in Dr. Hutton's comprehensive Treatise on Mensuration.

Sphere (Armillary). See Armillary.

Sphere of activity of a body, is the utmost space to which the influence of such body extends.

Sphere, in astronomy, that concave orb or expanse which appears to invest our globe, and in which the heavenly bodies, the sun, moon, stars, planets, and comets, appear to be fixed at an equal distance from the eye. This is also called the sphere of the world; and it is the subject of spherical astronomy.

This sphere, as it includes the fixed stars, from whence it is sometimes called the sphere of the fixed stars, is immensely great. So much so, that the diameter of the earth's orbit is vastly small in respect of it; and consequently the centre of the sphere is not sensibly changed by any alteration of the spectator's place in the several parts of the orbit: but still in all points of the earth's surface, and at all times, the inhabitants have the same appearance of the sphere; that is, the fixed stars seem to possess the same points in the surface of the sphere. For, our way of judging of the places, &c. of the stars, is to conceive right lines drawn from the eye, or from the centre of the earth, through the centres of the stars, and thence continued till they cut the sphere; and the points where these lines so meet the sphere are the apparent places of those stars.

The better to determine the places of the heavenly bodies in the sphere, several circles are conceived to be drawn in the surface of it, which are called circles of the sphere.

Sphere, in geography, &c. denotes a certain disposition of the circles of the surface of the earth, with regard to one another, which varies in the different parts of it.

The circles originally conceived on the surface of the sphere of the world are almost all transferred, by analogy, to the surface of the earth, where they are conceived to be drawn directly underneath those of the sphere, or in the same positions with them; so that, if the planes of those of the earth were continued to the sphere of the stars, they would coincide with the respective circles on it. Thus, we have an horizon, meridian, equator, &c. on the earth. And as the equinoctial, or equator, in the heavens, divides the sphere into two equal parts, the one north and the other south, so does the equator on the surface of the earth divide its globe in the same manner. And as the meridians in the heavens pass through the poles of the equinoctial, so do those on the earth, &c. With regard then to the position of some of these circles in respect of others, we have a right, an oblique, and a parallel sphere.

A right or direct sphere is that which has the poles of the world in its horizon, and the equator in the zenith and nadir. In an *oblique sphere*, the equator, as well as the axis, cuts the horizon obliquely. And in a *parallel sphere*, the poles are in the zenith and nadir, and the equator and all the parallels of latitude are parallel to the horizon.

SPHE'RICAL. Sphe'ric. *a.* (from *sphere.*) 1. Round; orbicular; globular (*Keil*). 2. Planetary; relating to the orbs of the planets (*Shakspeare*).

Spherical triangle. See Trigonometry.

SPHE'RICALLY. *ad.* In form of a sphere.

SPHE'RICALNESS. Sphe'ricity. *s.* (from *sphere.*) Roundness; rotundity; globosity (*Digby*).

SPHERICS, the doctrine of the sphere, particularly of the several circles described on its surface; with the method of projecting the same on a plane. See Projection of the sphere.

SPHEROID, a solid body approaching to the figure of a sphere, though not exactly round, but having one of its diameters longer than the other.

This solid is usually considered as generated by the rotation of an oval plane figure about one of its axes. If that be the longer or transverse axis, the solid so generated is called an oblong spheroid, and sometimes prolate, which resembles an egg, or a lemon; but if the oval revolve about its shorter axis, the solid will be an oblate spheroid, which resembles an orange, and in this shape also is the figure of the earth, and the other planets. The capacity of a spheroid, whether prolate or oblate, is two thirds of that of its circumscribing cylinder.

Spheroid (Universal), a name given to the solid generated by the rotation of an ellipse about some other diameter, which is neither the transverse nor conjugate axis. This produces a figure resembling a heart. See Hutton's Mensuration, p. 352, 2d ed.

SPHEROIDAL, or Spheroi′dical. *a.* (from *spheroid.*) Having the form of a spheroid (*Cheyne*).

SPHE′RULE. *s.* (*sphærula*, Latin.) A little globe (*Cheyne*).

SPHEX. Savage. In zoology, a genus of the class insecta, order hymenoptera. Mouth with an entire jaw, the mandibles horny, incurved, toothed; lip horny, membranaceous at the tip; feelers four; antennas with about ten articulations; wings in each sex plane, incumbent, and not folded; sting pungent, and concealed within the abdomen.

This genus contains insects, perhaps the most fierce and rapacious of this class of beings. The savage, or ground bee, does not feed upon honey, or accommodate its young with that kind of provision. They attack insects much beyond their own size, and that whether they are defenceless or armed; for they are provided with strong jaws, and a sting poisoned with a liquor fatal to every animal they engage. The savage seizes boldly on the insect he attacks, and gives it a stroke of amazing force. After this first encounter, he falls down, as if he had himself received the mortal blow; but it is only to rest from his fatigue, and to observe the effects of his prowess. Presently the wounded animal dies; and while yet palpitating with life, the savage devours those organs which he finds most palatable, leaving the greater part entire.

It is thus that the sphex riots in the blood of hundreds of insects; and his family is no sooner increased, than the carnage becomes proportioned to the number of young he has to support. After the female has deposited her eggs in the bottom of a cell dug in the ground, or in the mud wall of a cottage, the whole apartment is crammed with multitudes of living and dead insects, destined to be the food of the future progeny. Thus their houses, like the renowned caves of the giants, are strewed with dead. This operation is no sooner over, than the parent insects stop up the hole at the entrance of the cell, to prevent the escape of such of the wretched captives as may yet be alive: and hence the young, when they leave their eggs, find themselves amply supplied with provision. They devour, one after another, all the carcases with which they are provided; and by the time their last fly is eaten, they have no longer occasion for food, but are changed each into chrysalis, which afterward become savages of one species or another, according to that of the parent pair.

The individuals belonging to the division B are found chiefly on umbellate plants; the larves without feet, soft, and inhabiting the body of some other insect, on whose juices it exists: the pupe has rudiments of wings. A hundred and twenty-nine species, scattered over the globe; seven common to our own country. They are thus subdivided:

A. Antennas setaceous; lip entire, tongueless. The tribe evania of Fabricius.

B. Antennas filiform; lip emarginate, with a bristle on each side; tongue inflected, trifid.

α. Abdomen petiolate.

β. Abdomen sessile.

The following may serve as examples.

1. S. spirifex. Turner savage. Of a chesnut brown, with a shade of blue; eyes large and black; antennas brown; body ferruginous; thorax and abdomen connected together by a yellow thread; wings of a dusky brown, and sting yellow.

Inhabits Europe and Egypt, in cylindric cavities, wrought within like a honey-comb, on the sides of cliffs, and on the mud-walls of cottages. It is found in our own country.

2. S. viatica. Black; slightly hairy; wings brown; fore part of the abdomen ferruginous with black bands; seizes and buries caterpillars one by one in its cells, depositing at the same time an egg in each, and then closing them up.

3. S. sabulosa. Black and hairy; the second and third joints of the abdomen ferruginous. Inhabits sandy and gravelly places, in which the female digs holes with her fore-feet, pawing like a dog, in order to form cells for the deposit of caterpillars or spiders. Like the last she deposits one in each, and at the same time drops one of her own eggs, and fills up the opening. See Nat. Hist. Pl. CLXXVIII.

SPHINCTER. (σφιγκτηρ, from σφιγγω, to shut up.) The name of several muscles, whose office is to shut or close the aperture around which they are placed.

Sphincter ani. Sphincter externus of Albinus and Douglas. Sphincter cutaneus of Winslow. A single muscle of the anus, which shuts the passage through the anus into the rectum, and pulls down the bulb of the urethra, by which it assists in ejecting the urine and semen. It arises from the skin and fat that surround the verge of the anus on both sides, near as far as the tuberosity of the ischium; the fibres are gradually collected into an oval form, and surround the extremity of the rectum. It is inserted by a narrow point into the perineum, acceleratores urinæ, and transversi perinei; and behind into the extremity of the os coccygis, by an acute termination.

S. ani cuta′neus. See Sphincter ani.

S. ani externus. See Sphincter ani.

S. ani internus. Albinus and Douglas call the circular fibres of the muscular coat of the rectum which surround its extremity by this name.

Sphincter labiorum. See **Orbicularis oris.**

S. oris. See **Orbicularis oris.**

S. vaginæ. A muscle which contracts the mouth of the vagina, and compresses its corpus cavernosum.

S. vesicæ. Constrictor cunni of Albinus. Second muscle of the clitoris of Douglas. This muscle arises from the sphincter ani and from the posterior side of the vagina near the perineum; from thence it runs up the side of the vagina, near its external orifice, opposite to the nymphæ, covers the corpus cavernosum, and is inserted into the crus and body or union of the crura clitoridis. Its use is to contract the mouth of the vagina.

SPHINX, in fabulous history, a monster which had the head and breasts of a woman, the body of a dog, the tail of a serpent, the wings of a bird, the paws of a lion, and an human voice. It sprang from the union of Orthos with the Chimæra, or of Typhon with Echidna. The Sphinx had been sent into the neighbourhood of Thebes by Juno, to punish the family of Cadmus, and it raised continual alarms by proposing enigmas, and devouring the inhabitants if unable to explain them. The Thebans, however, were told by the oracle, that the Sphinx would destroy herself as soon as one of her enigmas was explained. In this enigma she wished to know what animal walked on four legs in the morning, two at noon, and three in the evening. Upon this Creon, king of Thebes, promised his crown and his sister Jocasta in marriage to him who could deliver his country by a successful explanation. It was at last happily explained by Œdipus, who observed, that man walked on his hands and feet when young or in the morning of life, at the noon of life he walked erect, and in the evening of his days he supported his infirmities upon a stick. (Vide **Œdipus**). The Sphinx no sooner heard this explanation than she dashed her head against a rock, and immediately expired.

Sphinx. Hawk-moth. In zoology, a genus of the class insecta, order lepidoptera. Antennas somewhat prismatic, tapering at each end; tongue (in most) exserted; feelers two, reflected; wings deflected. A hundred and seventy-five species; thus divided into sections.

A. Antennas scaly; feelers hairy; tongue spiral.

B. Antennas cylindrical; tongue exserted, truncate; wings entire; forming the tribe sesia of Fabricius.

C. Antennas thicker in the middle; tongue exserted, setaceous: the tribe zygæna of Fabricius.

Of this genus about fifteen or sixteen inhabit our own country: the rest are scattered over the globe, and belong to different quarters. They fly abroad only in the morning and evening, are very slow on the wing, and often make a humming kind of noise: they extract the nectary of flowers with the tongue: the larve has sixteen feet, and is pretty active; that of the zygæna is thick, fat, and covered with short hairs; that of the sesia generally naked, unarmed, and thinner towards the head; the others have generally a sharp, stiff, erect horn behind. The pupe is quiescent; that of the zygæna folliculate, and a little tapering forwards; the rest naked and smooth; that of the sesia pointed at each end, of the others very obtuse behind.

The following species are chiefly worthy of notice.

1. S. ocellata. Wings angular, lower ones rufous, with a blue eye. Larve solitary, tailed, rough, green with oblique, lateral, pale stripes, and ocellate dots: pupe dark chesnut brown. Inhabits England and Europe generally on the willow; the larve retires under ground in order to submit to its change into the chrysalis state in the month of August or September, and in the following June appears a complete insect.

2. S. atropos. Wings entire; lower ones yellow, with two brown bands; abdomen yellow, with black belts. Larve solitary, tailed, yellow, dotted with black, and divided blue and green lateral transverse lines, tail reflected; pupe dark brown, with five black stigmata on each side. Both the insect and larve or caterpillar are highly beautiful: the latter is principally found on the potatoe and the jasmine, these plants being its favourite food. It usually changes into its pupe state in September, retiring for that purpose pretty deep beneath the surface of the earth: the complete insect emerging the following June or July.

The most remarkable part of this insect is the representation of a death's head, which is seen upon the upper part of the thorax: this mournful picture is formed by a large irregular gray patch, marked with two black dots near the middle. In the province of Brittany the people were afflicted during a certain season with an epidemic disorder, which often proved mortal; the inhabitants were greatly alarmed by the unusual numbers of these insects, which the common people imagined came to forebode their destruction, by this portentous representation upon their backs. The Royal Academy was consulted, whether the sphinx, by its uncommon numbers, might not be the cause of this calamity, so great was the alarm which their appearance created.

The sphinx atropos, when hurt, has the power of uttering a dismal and melancholy cry, like a mouse; owing, perhaps, to the violent rubbing of some of its scaly members.

3. S. ligustri. Wings entire; lower ones rufous with three black bands; abdomen red with black belts. Larve tailed, green, with oblique lateral streaks, flesh-colour before, and white behind; pupe brown, the tail four-toothed. Found on privet, lilac, the poplar, and some other trees, in July and August; changes to its pupe state in September, retiring under ground for this purpose; and in the ensuing June emerging into the form of the complete insect.

4. S. fillipendulæ. Upper wings oblong-

oval, dark shining green with blood-red spots; lower wings red with dark green edging. Larve pale yellow, with rows of squarish black spots, often seen feeding on various grasses and other meadow plants: does not retire under ground for its transformation, but incloses itself in an oval shining yellow web of silk, attached to a grass-spike. The complete insect emerges from the pupe in about three weeks, and is found on the drop-wort, whence its specific name.

SPHONDY′LIUM. (ϛπονδυλιον, from ϛπονδυλος, vertebra; named from the shape of its root; or probably because it was used against the bite of a serpent, called ϛπονδυλις.) This is supposed to be the branekursine. See BANCA URSINA.

SPHYGMUS. SPHYXIS. (from ϛφυζω, to leap.) The pulse: whence asphyxy, loss of pulsation; pulselessness; lifelessness.

SPI′AL. *s.* (*espial*, French.) A spy; a scout; a watcher: obsolete (*Fairfax*).

SPICA. (from *spes*, hope; from ϛπιζω, to extend; or from σπαχυς, Æol. for σταχυς, whence *spicus*, *spica*, and *spicum*; for it is used in all the three genders.) In botany, a spike.—Flores sessiles sparsim alterni in pedunculo communi simplici.—In Term. Bot. 461, sparsim is omitted.—A species of inflorescence, in which sessile flowers are (scatteringly) alternate on a common simple peduncle.—As in an ear of wheat, rye, or barley; many of the grasses; in lavender, mullein, agrimony, &c. A spike is

1. Simple, distich, compound, glomerate.
2. Ovate, cylindric, ventricose, interrupted.
3. Imbricate, jointed, branching, one-ranked, or secundine, linear, ciliate, leafy, bristle-shaped, comose or terminated with a bush of leaves, scariose.

SPICA VIRGINIS, in astronomy, a star of the first magnitude in the constellation Virgo.

SPICE, any kind of aromatic drug or condiment, that has hot and pungent qualities; as pepper, nutmeg, ginger, cinnamon, cloves, &c.

SPICE (All). In botany. See PIMENTO and MYRTUS.

SPICE (Carolina All). See CALYCANTHUS.

SPICE ISLANDS. See MOLUCCAS.

To SPICE. *v. a.* (from the noun.) To season with spice (*Donne*).

SPI′CER. *s.* (from *spice.*) One who deals in spice (*Camden*).

SPI′CERY. *s.* (*espiceries*, French.) 1. The commodity of spices (*Raleigh*). 2. A repository of spices (*Addison*).

SPICK *and* SPAN. Quite new; now first used.

SPI′CKNEL or SPIGNEL. *s.* (*meum.*) The herb maldmony or bearwort.

SPI′COSITY. *s.* (*spica*, Latin.) The quality of being spiked like ears of corn; fulness of ears.

SPICULA. A spicule or spikelet. A partial spike, or a subdivision of it: as in some grasses.

SPI′CY. *a.* (from *spice.*) 1. Producing spice; abounding with aromatics (*Dryden*). 2. Aromatic; having the qualities of spice (*Pope*).

SPIDER, in entomology. See ARANEA.

SPIDERWORT, in botany. See ANTHERICUM.

SPIELMANNIA, in botany, a genus of the class didynamia, order angiospermia. Calyx five-cleft; border of the corol five-cleft; the orifice closed with hairs; stigma hooked; drupe tubercled, with a two-celled nut. One species only, a shrub of the Cape, bearing divided into two equal hemispheres.

SPIGELBURG, a town of Westphalia, capital of a county of the same name, 22 miles SW. of Hildesheim. Lon. 9. 46 E. Lat. 51. 56 N.

SPIGELIA. Worm grass. In botany, a genus of the class pentandria, order monogynia. Corol funnel-form, capsule double, two-celled, many-seeded. Two species.

1. S. anthelmia. Stem herbaceous; upper leaves in fours; a native of the West Indies; and formerly employed as an anthelmintic in medicine, though probably inferior in strength to the next species.

2. S. marilandica. Perennial worm grass. Stem square, all the leaves opposite, sessile, entire; flowers large, spiked, swelling in the middle, deep-red. The whole of this plant, but most commonly the root, is employed as an anthelmintic by the Indians and inhabitants of America. Dr. Hope has written in favour of this plant, in continued and remitting low worm fevers: besides its property of destroying the worms in the primæ viæ, it acts as a purgative.

Both these plants are still sold, in some places, as vermifuges, under the name of Indian pink.

SPIGELIAN LOBE. See LIBER.

SPIGNEL. See ATHAMANTA.

SPI′GOT. *s.* (*spijcker*, Dutch.) A pin or peg put into the faucet to keep in the liquor (*Shakspeare*).

SPIKE. *s.* (*spica*, Latin.) 1. An ear of corn, &c. See SPICA. 2. A long nail of iron or wood; a long rod of iron sharpened (*Addison*).

To SPIKE. *v. a.* 1. To fasten with long nails (*Moxon*). 2. To set with spikes (*Wiseman*). 3. To make sharp at the end.

SPIKE (Oil of), a name sometimes given to essential oil of turpentine; an article much used by varnishers and painters.

SPIKENARD. See NARDUS and BACCHARIS.

SPILANTHES, in botany, a genus of the class syngenesia, order polygamia æqualis. Receptacle chaffy, conic; down consisting of two awns, one of them less, calyx nearly equal. Nine species; natives of South America, the West Indies, or Ceylon; annuals, with white or yellow radiate flowers.

SPILEMBURGO, a town of Italy, in Venetian Friuli, 37 miles N.W. of Aquileia, and 47 N. by E. of Venice. Lon. 12. 15 E. Lat. 46. 10 N.

SPILL. *s.* (*spijlen*, Dutch.) 1. A small shiver of wood, or thin bar of iron (*Mortimer*). 2. A small quantity of money (*Ayliffe*).

To Spill. *v. a.* (ꞅpillan, Saxon; *spillen*, Dutch.) 1. To shed; to lose by shedding (*Daniel*). 2. To destroy; to mischief (*Davies*). 3. To throw away (*Tickel*).

To Spill. *v. n.* 1. To waste; to be lavish (*Sidney*). 2. To be shed; to be lost by being shed (*Watts*).

SPI'LLER. *s.* (We know not whence derived.) A kind of fishing line (*Carew*).

SPILOMA, in botany, a tribe of the cryptogamic class Lepraria, which see.

SPILSBY, a town in Lincolnshire, with a market on Monday, seated on the side of a hill, 30 miles E. of Lincoln, and 132 N. by E. of London. Lon. 0. 7 E. Lat. 53. 12 N.

SPILTH. *s.* (from *spill.*) Any thing poured out or wasted (*Shakspeare*).

To **SPIN.** *v. a.* pret. *spun* or *span*, part. *spun.* (ꞅpinnan, Saxon; *spinnen*, Dutch.) 1. To draw out into threads (*Exodus*). 2. To form threads by drawing out and twisting any filamentous matter (*Dryden*). 3. To protract; to draw out (*Addison*). 4. To form by degrees; to draw out tediously (*Digby*). 5. To put into a turning motion, as a boy's top.

To Spin. *v. n.* 1. To exercise the art of spinning, or drawing threads (*More*). 2. To stream out in a thread or small current (*Drayton*). 3. To move round as a spindle (*Milton*).

SPINA ACIDA. See Berberis.

Spina bifida. A tumour upon the spine of new born children immediately about the lower vertebræ of the loins, and upper parts of the sacrum; at first it is of a dark blue colour, but in proportion as it increases in size, approaches nearer and nearer to the colour of the skin, becoming perfectly diaphanous.

From the surface of this tumour a pellucid watery fluid sometimes exudes, and this circumstance has been noticed by different authors. It is always attended with a weakness, or, more properly speaking, a paralysis of the lower extremities. The opening of it rashly has proved quickly fatal to the child. Talpius, therefore, strongly dissuades us from attempting this operation. Acrel mentions a case where a nurse rashly opened a tumour, which, as she described it, was a blood bag on the back of the child at the time of its birth, in bigness equal to a hen's egg, in two hours after which the child died. From the dissection it appeared that the bladder laid in the middle of the os sacrum, and consisted of a coat, and some strong membrane, which proceed from a long fissure of the bones. The extremity of the spinal marrow lay bare, and the spinal duct in the os sacrum was uncommonly wide, and distended by the pressure of the waters. Upon tracing it to the head, the brain was found nearly in its natural state, but the ventricles contained so much water that the infundibulum was quite distended with it, and the passage between the third and fourth ventricle was greatly enlarged.

He likewise takes notice of another case, where a child lived about eight years labouring under this complaint, during which time it seemed to enjoy tolerable health, though pale. Nothing seemed amiss in him, but such a degree of debility as rendered him incapable to stand on his legs.

The tumour, as in the former case, was in the middle of the os sacrum, of the bigness of a man's fist, with little discolouring; and upon pressing it became less. When opened it was found full of water, and the coats were the same as in the former, but the separation of the bones was very considerable. The spinal marrow, under the tumour, was as small as a packthread, and rigid; but there were no morbid appearances in the brain.

Spina cervina. (so called from its thorns resembling those of the stag.) Rhamnus catharticus. Spina infectoria. Cervispina. Purging buckthorn. The fruit or berries of this shrub, rhamnus catharticus of Linnéus (rhamnus spinis terminalibus floribus quadrifidis dioicis, foliis ovatis, caule erecto. C. O. Pentandria, monogynia), have been long received into the materia medica: they contain a pulpy deep green juice, of a faint unpleasant smell, a bitterish, acrid, nauseous taste, which operate briskly by stool, producing thirst, dryness of the mouth and fauces, and severe gripings, unless some diluting liquor be drank plentifully after it: made into syrup, it is the officinal preparation, which at present is rarely prescribed except as a drastic purge. See Rhamnus.

Spina infectoria. See Spina cervina.

Spina ventosa, in surgery, a tumour arising from an internal caries of a bone. It most frequently occurs in the carpus and tarsus, and is known by a continual pain in the bone, and a red swelling of the skin, which has a spongy feel.

SPINACH, in botany. See Spinachia.

Spinach (Strawberry). See Blitum.

SPINACHIA. Spinage, or Spinach. In botany, a genus of the class dioecia, order pentandria. Male: calyx five-parted; corolless. Fem.: calyx four-cleft; corolless; styles four; seed, one within the hardened calyx. Two species only.

1. S. oleracea. Garden spinach. Fruit sessile, unarmed, or prickly. Of this species there are several varieties cultivated in the kitchen-garden. The common spinach, intended for winter use, should be sown on an open spot of ground in the latter end of July, observing to do it, if possible, when the weather is rainy. When the young plants are come up, the weeds must be destroyed, and the plants left at about five inches asunder. The ground being kept clear of weeds, the spinach will be fit for use in October. The way of gathering it to advantage is only to take off the longest leaves, leaving those in the centre to grow larger: and at this rate a bed of spinach will furnish the table for the whole winter, till the spinach sown in spring is become fit for use, which is commonly in April.

This plant of Linnéus is sometimes directed for medicinal purposes in the cure of phthisical complaints; made into a poultice, by boiling the leaves and adding some oil, it forms an excellent emollient. As an article of food it may be considered as similar to cabbage and other oleraceous plants.

2. S. fera. Wild spinach. Producing its fruit on peduncles. A native of Siberia.

SPI'NAL. *a.* (*spina*, Lat.) Belonging to the back bone.

Spinal marrow. See Medulla spinalis.

SPINALIS CERVICIS, in anatomy. This muscle, which is situated close to the vertebræ at the posterior part of the neck and upper part of the back, arises, by distinct tendons, from the transverse processes of the five or six uppermost vertebræ of the back, and, ascending obliquely under the complexus, is inserted, by small tendons, into the spinous processes of the sixth, fifth, fourth, third, and second vertebræ of the neck.

Its use is to extend the neck obliquely backwards.

Spinalis dorsi, in anatomy. This is the name given by Albinus to a tendinous and fleshy mass, which is situated along the spinous processes of the back and the inner side of the longissimus dorsi.

It arises tendinous and fleshy from the spinous processes of the uppermost vertebræ of the loins, and the lowermost ones of the back, and is inserted into the spinous processes of the nine uppermost vertebræ of the back.

Its use is to extend the vertebræ, and to assist in raising the spine.

SPINALONGA, a seaport of the island of Candia, with a good harbour and a citadel. It is situate near a cape of the same name, 30 miles E. of Candia. Lon. 25. 48 E. Lat. 35. 20 N.

SPI'NDLE. *s.* (ꞅpinꝺl, ꞅpinꝺel, Saxon.) 1. The pin by which the thread is formed, and on which it is conglomerated (*Maine*). 2. A long slender stalk (*Mortimer*). 3. Any thing slender: whence *spindle shanks* (*Dryden*).

Spindle, in geometry, a solid body generated by the revolution of some curve line about its base or double ordinate; in opposition to a conoid, which is generated by the rotation of the curve about its axis or absciss, perpendicular to its ordinate.

The spindle is denominated circular, elliptic, hyperbolic, or parabolic, &c. according to the figure of its generating curve. See Hutton's Mensuration, in several places.

Spindle, in mechanics, sometimes denotes the axis of a wheel, or roller, &c.; and its ends are the pivots.

To Spi'ndle. *v. n.* (from the noun.) To shoot into a long small stalk (*Bacon*).

SPINDLESHA'NKED. *a.* (*spindle* and *shank*.) Having small legs (*Addison*).

Spindle-shaped, in botany. See Fusiform.

Spindle tree. See Euonymus.

Spindle tree (Bastard). See Celastrus.

SPINE. (from *spina*, thorn; so called from the spine-like processes of the vertebræ.) Spina dorsi. Columna spinalis. Columna vertebralis. A bony column or pillar extending in the posterior part of the trunk from the great occipital foramen to the sacrum. It is composed of twenty-four bones called vertebræ. The cavity that runs down the middle, and which contains the spinal marrow, is called the specus or theca vertebralis. See Vertebræ and Anatomy.

SPINELL, in mineralogy, a species of ruby, of a rose-red hue, and generally distinguished by the name of balais, or balass ruby. It is the gemma spinellus of Gmelin's edition of Linnéus. See Gemma.

This stone, which is usually obtained from the island of Ceylon, is usually crystallized. The form of its integrant particles is the tetrahedron. The primitive form of its crystals is a regular octahedron, composed of two four-sided pyramids applied base to base, each of the sides of which is an equilateral triangle. In some cases two opposite sides of the pyramids are broader than the other two; and sometimes the edges of the octahedron are wanting, and narrow faces in their place. For figures and descriptions of these and other varieties of these crystals, the reader is referred to Romé de Lisle and the abbé Estner. It occurs also in tetrahedrons, in rhomboids whose faces have angles of 120° and 60°, in rhomboidal dodecahedrons, and in four-sided prisms terminated by four-sided pyramids.

The texture of the spinell is foliated. Fracture conchoidal. Its lustre is 3. Transparency 2 to 4. It causes a single refraction. Hardness 13. Specific gravity 3.570 to 3.625. Colour red, of various shades: sometimes also blue, green, and yellow. The constituents of the spinell are, according to

Vauquelin,	Klaproth,
86.00 alumina	76 alumina
8.50 magnesia	16 silica
5.25 chronic acid	8 magnesia
	1.5 oxyd of iron
99.76	
	101.5

There is another species of spinell which has lately much engaged the attention of the mineralogists, and which has been denominated, by the abbé Haüy, pleonast spinell. This, which may be regarded as a brown garnet or schoerl in truncated dodecahedrons of Romé de Lisle, was originally found in the island of Ceylon, among tourmalines and other crystalline substances, with which it was confounded. Delamétherie first made a distinct species of it under the name of ceylanite. Sometime afterward he found it in rocks thrown up by Vesuvius. Mr. Lhermina subsequently observed it in the same rocks: and Mr. Lewis Cordier lately obtained it from almost all the volcanic rocks in the environs of Closterlach on the borders of the Rhine. Draparnaud mentions pleonast in the brecciæ of the little basaltic mountain of Montferrier: in fact it is met with there in a tufa, that has the form of a breccia. "I have never yet found it," says M. Marcel de Serres, "in a breccia, but like those that came from Ceylon, which are most commonly in amorphous or rounded masses, that have experienced a commencement of alteration. Perhaps this word is too strong to mark the state in which this substance is found, for it appears too hard to alter easily; yet its colour is so dull that it appears to be altered."

Apparently the pleonast is a very accidental mixture in the breccia: a few of the crystals, detached from the rocks in which they were contained, have been united to the various surrounding substances by some cement. Crystallized pleonast rubies are found likewise in the bottom of the gullies at the foot of the little mountain of Montferrier, and almost always on the surface of the Detritus of the surrounding substances.

A totally different situation, where this substance equally presents itself, and in pretty large quantity, is at Soret, on the left bank of the Lez, about a mile from Montpellier. It is found on the surface of a sand mixed with shells and bowldered quartz. This sand rests on strata of sandstone, and very various and heterogeneous agglomerations of the same nature. Sometimes these strata are covered by others of shelly limestone, filled chiefly with the oyster, cockle, and acorn shell. The oysters frequently contain others, which appear to have grown in their cavity. The strata of sandstone are very irregular, most frequently horizontal, and containing numerous concretions of sandstone, in the shape of pears, apples, and tears, almost always in the same position; which indicates that these concretions were not formed in the manner of common stalactites, but as the nodules of silex.

It appears evident, that the pleonasts occur in them accidentally, and were brought thither by the waters. Some have been since found in the volcanic hill of Valmahargues, 6 kil. (3¾ miles) north of Montpellier; and likewise in a stratum of basaltic tufa 3 kil. (15 furlongs) long, at the bottom of a hill called *lou Hâout*, or *lou Nâout*, near Prades, on the north-east of Montferrier.

A question, by no means uninteresting, that naturally presents itself, is, whether the pleonast ruby be a volcanic product or not. From its hardness it might be presumed that it is altogether foreign to the lavas, and formed in the humid way, anterior to its deposition in the strata where it is found. It may be said, that none has yet been seen in the lava of the Vivarais, Auvergne, Etna, the Lipari islands, Iceland, or the Isle of France; but only in the cavities of some rocks of Vesuvius, Somma, Closterlach, and Campania. Hence we have sufficient reason to believe, that it belongs to the primitive rocks, and that to see it intimately united with the tourmalines of Ceylon is sufficient to convince us of this.

Brongniart however is of opinion, that this mineral, as well as the telesia, or corundum, belongs to the secondary trap formation. His opinion is founded perhaps upon that of Werner; who judges from the nature of the strata, of which the sand containing corundums appears to be the remains, that those of a hardness much superior to the pleonast must belong to that formation. Thus as basaltes and basaltic tufa are rocks of the secondary trap mountains, and these are met with in the places where the pleonast is found, this opinion appears to have some probability: but as we have not yet any accurate description of the mineralogical situation of the corundums; and as the adamantine spar is found in granite rocks, entering even into their composition in the same manner as feldspar; we may consider the corundum, adamantine spar, and pleonast, as belonging exclusively to the primitive formations. This opinion however can rank only as a probability, till we have a precise knowledge of the mineralogical situation of these interesting substances.

SPINELLANE, a gem lately discovered by M. Nose, and described by him in a paper introduced into vol. lxix. of the Journal de Physique, on the mineralogy of the mountains of the Rhine. He found it on the banks of the lake of Laach, near Andernach. It is in a rock composed of various substances, as oxyd of iron, quartz, hornblende, mica, and some other substances, to which he has given peculiar names, such as,

1. A variety of tabular feldspar, which he calls sanidin;

2. Another substance, crystallized in small silky tufts, which he calls desmin.

The spinellane has a brownish colour.

Its form appears to be that of a hexaedral prism, terminated by triedral pyramids with rhomboidal faces.

Mr. Nose however imagines, that he has observed a great many points of resemblance between it and the balass ruby, or spinelle, whence he has been led to give it the name of spinellane.

It does not rank very high in point of hardness, but is sufficiently hard to scratch glass.

SPINESCENT. Spinescens. In botany, becoming hard and thorny. Incident to petioles and stipules.

SPINET. (from the Latin.) A stringed musical instrument formerly much in use, somewhat similar to the harpsichord, and, like that, consisting of a case, sounding-board, keys, jacks, and a bridge. The difference of the spinet and harpsichord is, that the latter is larger, and contains two or three sets of jacks and strings so disposed and tuned as to admit of a variety of stops, while the former has only one set of jacks and strings, and consequently only one stop.

When the spinet was first brought into use, though its invention was certainly anterior to that of the harpsichord, is not exactly known. But that it is derived from the harp is evident from its character as well as construction, internal and external: and, indeed, it was originally called the couched harp, though since denominated spinet, from its quills, which resemble thorns, called in Latin *spinæ*.

SPINI′FEROUS. *a.* (*spina* and *fero*, Lat.) Bearing thorns.

SPINIFEX, in botany, a genus of the class polygamia, order dioecia. Calyx, glume two-valved, two-flowered; the valves parallel to the rachis; corol, glume two-valved, awnless; stamens three; styles two; seed one. One species only, an East Indian grass with large glaucous culms; leaves crowded at the joints, spinous at the end.

SPI′NNER. *s.* (from *spin.*) 1. One skilled in spinning (*Graunt*). 2. A garden spider with long jointed legs (*Shakspeare*).

SPINNING, the act of reducing silk, flax, hemp, hair, wool, or other matter, into thread. Spinning is either performed on the wheel, or with a distaff and spindle, or with other machines proper for the several kinds of working. Hemp, flax, nettle-thread, and other like vegetable matters, are to be wetted in spinning: silks, wools, &c. are spun dry, at least they do not stand in need of water: there is, however, a way of spinning or reeling silk as it comes off the cases or balls, where hot, or even boiling, water is to be used. The vast variety and importance of these branches of our manufactures, which are produced from cotton, wool, and flax, spun into yarn, together with the cheapness of provisions, and the low price of labour, in many foreign countries, which are the rivals of our trade, have occasioned many attempts at home to render spinning more easy, cheap, and expeditious. Sir R. Arkwright has carried the invention to a high degree of perfection. He not only contrived methods for spinning cotton, but obtained a patent for making cotton, flax, and wool, into yarn. See Cotton, &c.

Spinning wheel. *s.* (from *spin.*) The wheel by which, since the disuse of the rock, the thread is drawn (*Gay*).

SPINO′SITY. *s.* (*spinosus*, Lat.) Crabbedness; thorny or briary perplexity (*Glanville*).

SPI′NOUS. *a.* (*spinosus*, Lat.) Thorny; full of thorns.

SPINOZA (Benedict de), the son of a Portuguese Jew settled at Amsterdam, where he was born in 1633. He commenced philosopher early in life; publicly embraced Christianity, for which the Jews attempted to assassinate him; and in the end made a great noise in the world by his atheistical principles and writings. He was probably the first who reduced atheism to a system; but in other respects his doctrine was the same with that of several philosophers both ancient and modern. He retired into the country that he might not be interrupted in his speculations, and was sometimes three months without going out of his lodgings. This retired life did not hinder his name from spreading. The free-thinkers came to him from all parts. The palatine count offered him the place of professor of philosophy at Heidelberg; but he refused it. He died at the Hague in 1677, aged about 44 years. He is said to have been honest, obliging, and very regular in his morals; which we need not be more surprised at than to see people live an irregular life though mentally persuaded of the truths of the gospel.

SPINOZISM, or Spinosism, the doctrine of Spinoza, or atheism and pantheism proposed after the manner of Spinoza.

SPI′NSTER. *s.* (from *spin.*) 1. A woman that spins (*Shakspeare*). 2. (In law.) The general term for a girl or maiden woman (*Swift*).

SPI′NSTRY. *s.* (from *spinster.*) The work of spinning.

SPINTHERE, a mineral discovered by the abbé Haüy imbedded in calcareous spar from Dauphiné. Colour greenish; found crystallized in irregular dodecahedrons composed of a double four-sided pyramid, obliquely truncated at the apexes. The crystals are very small and brightly shining; fracture lamellar; hardness inferior to that of glass; translucent on the edges: melts before the blow-pipe without much difficulty. It has not been analysed.

SPI′NY. *a.* (*spina*, Lat.) Thorny; briary; perplexed; difficult (*Digby*).

SPIO, in zoology, a genus of the class vermes, order mollusca. Body projecting from a tube, jointed and furnished with dorsal fibres; peduncles or feet rough with bristles and placed towards the back; feelers two, long, simple; eyes two, oblong. Two species, as follows.

1. S. seticornis. Feelers thin and striate. Inhabits the ocean, principally where there is a clayey bottom; about three inches long; the tube composed of agglutinated particles of earth, thin, erect, and thrice as long as the body: from this the animal projects its capillary white feelers in search of food, which consists of small marine worms; body whitish with a tinge of green, and a red line down the middle of the back, the hind-part sea-green; the fore-part blackish-grey with transverse white striæ; head pale.

2. S. filicornis. Feelers thick and annulate. Inhabits the seas about Greenland; an inch long. Body oblong, yellowish or reddish, with a cinereous line in the middle and at each end; tube fragile, erect, greenish, from which it projects its feelers in search of planariæ and other small marine worms.

SPIRÆA, in botany, a genus of the class icosandria, order pentagynia. Calyx five-cleft; petals five; capsules superior, two-valved, many-seeded. Twenty-two species; the greater number shrubby, the rest harbaceous; chiefly natives of Europe and North America; three or four common to our own country.

The following are cultivated.

1. S. salicifolia. Willow-leaved spiræa; of which not less than four varieties are found wild in our wet woods.

2. S. tomentosa. Scarlet spiræa.

3. S. hypericifolia. Hypericum-leaved spiræa.

4. S. argentea. Silvery-leaved spiræa.

5. S. chamædrifolia. Germander-leaved spiræa.

6. S. crenata. Hawthorn-leaved spiræa.

7. S. triloba. Three-lobe-leaved spiræa.

8. S. opulifolia. Currant-leaved spiræa.

9. S. sorbifolia. Service-leaved spiræa.

10. S. aruncus. Goat's-beard spiræa.

11. S. filipendula. Common dropwort. Found wild in our pastures.

12. S. ulmaria. Meadow-sweet. Queen of the meadow. Found wild in our meadows.

13. S. trifoliata. Three-leaved spiræa. All the shrubby sorts may be propagated by cuttings, suckers, or layers. The herbaceous may be increased by seeds or parting the roots. The double-flowered can only be preserved by the last method.

SPIRÆA (African). See Diosma.

SPI'RACLE. *s.* (*spiraculum*, Lat.) A breathing hole; a vent; a small aperture (*Woodward*).

SPI'RAL. *a.* (from *spira*, Lat.) Curve; winding; circularly involved (*Blackmore*).

Spiral, in geometry, a curve line of the circular kind, which, in its progress, recedes always more and more from a point within, called its centre; as in winding from the vertex of a cone down to its base.

There are various kinds of spirals; as the Archimedean spiral, the logarithmic spiral, the proportional spiral, the loxodromic spiral, &c. of which some lie entirely on one plane, others run along the curve surface of a solid, as is the case with the loxodromic.

Spiral, in architecture and sculpture, denotes a curve that ascends, winding about a cone, or spire, so that all the points of it continually approach the axis.

By this it is distinguished from the helix, which winds in the same manner about a cylinder.

For the mathematical disquisitions respecting the nature and properties of spirals, see the treatises at the end of Emerson's and Robertson's Conics; and the several treatises on Fluxions by Simpson, Dealtry, &c.

SPI'RALLY. *ad.* In a spiral form (*Ray*).

SPIRE. *s.* (*spira*, Latin.) 1. A curve line; any thing wreathed or contorted; a curl; a twist; a wreath (*Dryden*). 2. Any thing growing up taper; a round pyramid; a steeple (*Hale*). 3. The top or uppermost point (*Shakspeare*).

To **Spire**. *v. n.* (from the noun.) 1. To shoot up pyramidically (*Mortimer*). 2. To breathe: not in use (*Spenser*).

Spire, a bishopric of Germany, in the circle of Upper Rhine, 50 miles in length, and 30 in breadth, where broadest. It is divided into two parts by the Rhine, and is a fertile country.

Spire, a free imperial city of Germany, capital of a bishopric of the same name. It was burnt by the French in 1689; and, in 1693, the imperial chamber, which was in this city, was removed to Wetzlar. It was taken, in 1792, by the French, who evacuated it the next year, but re-entered it in 1794. It is seated on the W. side of the Rhine, 7 miles N. of Philipsburg. Lon. 8. 32 E. Lat. 49. 19 N.

SPIREBACH, a town of Germany, in the palatinate of the Rhine, seated on a river of the same name, 8 miles N. of Landau. Lon. 8. 12 E. Lat. 49. 20 N.

SPIRICS, the name given by Cittacus, an ancient Persian geometer, to the curves arising from the circumvolution of a circle, not about one of its diameters, but about any line whatever, situated either within or out of the circle. Some of these curves possess singular properties; but we cannot descant upon them here. The scientific reader may consult Montucla's Histoire des Mathematiques, tome iii. pp. 90, 93.

SPI'RIT. *s.* (*spiritus*, Latin.) 1. Breath; wind (*Bacon*). 2. An immaterial substance (*Davies*). 3. The soul of man (*Shakspeare*). 4. An apparition (*Luke*). 5. Temper; habitual disposition of mind (*Tillotson*). 6. Ardour; courage; elevation; vehemence of mind (*Shakspeare*). 7. Genius; vigour of mind (*Temple*). 8. Turn of mind; power of mind, moral or intellectual (*Cowley*). 9. Intellectual powers distinct from the body (*Clarendon*). 10. Sentiment; perception (*Shakspeare*). 11. Eagerness; desire (*South*). 12. Man of activity; man of life, fire, and enterprise (*Shakspeare*). 13. Persons distinguished by qualities of the mind (*Dryden*). 14. That which gives vigour or cheerfulness to the mind (*Shakspeare*). 15. Characteristical likeness; essential qualities (*Wotton*). 16. Any thing eminently pure and refined (*Shakspeare*). 17. That which hath power or energy (*South*). 18. An inflammable liquor raised by distillation; as, brandy, rum (*Boyle*). 19. In the old poets, *spirit* was a monosyllable, and often written *sprite*, or less properly *spright* (*Spenser*).

Spirit is used for any incorporeal being, or intelligence. In which sense God is said to be a spirit; angels are spirits; and the devil is an evil spirit.

In this sense the human soul is also called a spirit, from its thinking and reflecting powers, which cannot be conceived to reside in any thing material. See Soul.

F. Malebranche observes, it is extremely difficult to conceive what it is that should make the communication between the body and the spirit; for if the spirit have no material parts, it cannot move the body. But the argument must be false some how or other; for we believe that God can move bodies, although we do not attribute any material parts to him. We may conceive, without much stress to the imagination, that when two substances of contrary natures, an active and an inactive one (according to the essential distinction between matter and spirit) are joined together in a state of union, they should so affect each other, that the whole compound should neither appear perfectly dead, nor perfectly living; which is the very appearance we make: and that, as the one or the other principle prevailed, the compound should seem to partake of that nature. This is not hard to conceive generally, although the formal method how they may affect each other may not be conceivable by us. All this is very ingeniously illustrated by Andrew Baxter, in his Enquiry into the Nature of the Human Soul, in various parts. He shews clearly that all the difficulty in the mutual action of matter and spirit upon each other, is to be found in the motion of a clock; that matter because divisible cannot think; and that that which wills in us must be immaterial. Indeed it must be obvious to any one who possesses the capability, and will be at the pains to trace things to their causes, or to endeavour to explain phænomena, that there must be something essentially distinct from matter, something that is not necessarily inert, something whose distinguishing property is opposite to inertiæ; that something, whatever it be, is spirit.

Spirit, in theology, is used, by way of eminence, for the third person in the holy trinity, called the Spirit, the Holy Spirit, or Holy Ghost.

The Socinians deny the personality of the spirit; and the Arians his co-equality with the father.

Spirit (Order of the). See Holy Ghost.

Spirit, is also used, among divines, for the divine power, and virtue, and the communication thereof to men.

In this sense the Spirit is said to have gone out on the face of the deep, Gen. i. 2. and the prophets to have been possessed with the spirit of God. Providence, in this sense, is that universal spirit whereby God makes all nature to act.

Thus the Holy Virgin is said to have conceived of the Spirit.

Spirit (Private), is a term that made a great figure in the controversies of the two last centuries. It signifies the particular sense or notion each person has of the dogmata of faith, and the truths of religion, as suggested by his own thoughts, and the persuasion he is under with regard to them.

The first reformers denying strenuously any infallible interpreter of the scripture, or any settled judge of controversies, maintained, that every person was to interpret and judge of revealed truths by his own light, assisted by the grace of God; and this was what they called private spirit, or judgment.

Against this, the arguments used by the Romanists are, that revealed truths being one and the same for all believers; the rule God has given us for judging of them ought to represent them to us uniformly, and the same; but the private spirit informs Luther one way, and Zuinglius another. It divides Oecolampadius, Bucer, Osiander, &c. And the doctrine it discovers to the confessionites is quite different from that it shews the anabaptists and mennonites, in the very same passage of scripture.

Spirit, (*spiritus*), is also used, in prosody, to signify the greater or less degree of breath employed in the pronunciation of the initia Greek vowels, and of the letter ρ.

To **Spi'rit.** *v. a.* 1. To animate or actuate as a spirit (*Milton*). 2. To excite; to animate; to encourage; to invigorate to action (*Swift*). 3. To draw; to entice (*Brown*).

SPI'RITALLY. *ad.* (from *spiritus*, Latin.) By means of the breath (*Holder*).

SPI'RITED. *a.* (from *spirit.*) Lively; vivacious; full of fire (*Pope*).

SPI'RITEDNESS. *s.* (from *spirited.*) Disposition or make of mind (*Addison*).

SPI'RITFULNESS. *s.* (from *spirit* and *full.*) Sprightliness; liveliness (*Harvey*).

SPI'RITLESS. *a.* (from *spirit.*) Dejected; low; deprived of vigour; depressed (*Smith*).

SPIRITOSO, in music. With spirit.

SPI'RITOUS. *a.* (from *spirit.*) 1. Refined; defecated; advanced near to spirit (*Milton*). 2. Fine; ardent; active.

SPI'RITOUSNESS. *s.* (from *spiritous.* Fineness and activity of parts (*Boyle*).

SPI'RITUAL. *a.* (*spirituel*, French, from *spirit.*) 1. Distinct from matter; immaterial; incorporeal (*Bacon*). 2. Mental; intellectual (*South*). 3. Not gross; refined from external things; relative only to the mind (*Calamy*). 4. Not temporal; relating to the things of heaven; ecclesiastical (*Swift*).

SPIRITUA'LITY. *s.* (from *spiritual.*) 1. Incorporeity; immateriality; essence distinct from matter (*Raleigh*). 2. Intellectual nature (*South*). 3. Acts independent of the body; pure acts of the soul; mental refinement (*South*). 4. That which belongs to any one as an ecclesiastic (*Ayliffe*).

SPI'RITUALTY. *s.* (from *spiritual.*) Ecclesiastical body: not in use (*Shakspeare*).

SPIRITUALIZA'TION. *s.* (from *spiritualize.*) The act of spiritualizing.

To SPI'RITUALIZE. *v. a.* (*spiritualiser*, Fr.) To refine the intellect; to purify from the feculencies of the world (*Rogers*).

SPI'RITUALLY. *ad.* (from *spiritual.*) Without corporeal grossness; with attention to things purely intellectual (*Taylor*).

SPI'RITUOUS. *a.* (*spiritueux*, French.) 1. Having the quality of spirit, tenuity and activity of parts (*Arbuthnot*). 2. Lively; gay; vivid; airy (*Wotton*).

SPIRITUO'SITY. Spi'rituousness. *s.* (from *spirituous.*) The quality of being spirituous; tenuity and activity.

SPIRITS (Distilled). Inflammable liquors obtained by distillation from a variety of substances that have passed into the vinous fermentation. The process by which these are procured in their most perfect state forms an important branch of chemistry; and the liquors themselves an important branch of political revenue.

The substances chiefly employed are the fruit of the vine, from which is obtained brandy; the saccharine matter of the sugar-cane, which yields rum; and barley or other grain, which gives us all that variety which is known by the name of corn-spirits, as whisky, geneva, and for the most part spirits of wine or alcohol.

The most important step in the production of distilled spirits is the process of the vinous fermentation, whatever be the vegetable material made use of. Upon this subject we have treated cursorily and generally in the article FERMENTATION, to which we may still refer the reader as a kind of preliminary chapter. Under the present head, however, it becomes us to notice this species of fermentation more particularly, and the sketch we shall offer shall be drawn up for the most part from M. Duportal's Observations on M. Chaptal's treatise communicated in the Annales de Chimie, for 1810.

The equilibrium in the composition of vegetable substances is speedily destroyed when their life escapes from them. These substances very soon undergo a change in their appearance, the principles which compose them reacting upon each other; they are arranged in a new order, and in new proportions, whence result products very different from those circumstances which gave rise to their production.

These products vary according to the nature of the substances, and according to the various circumstances which accompany their change. Thus, vegetable substances which are decomposed in some peculiar circumstances undergo a spontaneous alteration which is called fermentation, in which the product is bread, an intoxicating liquor, or vinegar, according to the matter subjected to fermentation; while recent herbaceous plants, which putrefy, give rise to the formation of mould.

These are the facts pointed out by M. Chaptal in his work. Examining first the fermentation of vegetables of a fleshy and juicy texture, when collected into a large heap, he details the conditions, the phænomena, and the result of the process. He afterwards considers the operation in each of the separate parts of which vegetables consist; and confines himself to the three kinds of fermentation called the pannary, the vinous, and the acetous. It will be only necessary for us to follow him in the second.

VINOUS FERMENTATION.

This operation can only take place when sugar, water, and a ferment are mixed together. Sugar is the matter of fermentation; the ferment is the agent of it; the presence of water is a necessary condition, as well as a certain degree of temperature. It is because these three substances exist in a state of union in the saccharine juices, that these are capable of the vinous fermentation.

What are the chemical changes which substances subjected to the vinous fermentation undergo? If one considers the composition of these substances, and that of the products of the operation, it will be easy to conceive with M. Thenard, that in it the ferment takes away from the sugar a small quantity of oxygen, whereby it becomes a substance *sui generis*, whose principles not being able to remain in their present arrangement, react upon each other, combine in a new and different order, producing alcohol dissolved in water, and more carbonic acid gass; the ferment which caused these phænomena is itself altered in part, and precipitated; while the water only serves to bring the molecules into contact, and to retain the alcohol.

The methods in use for subjecting different substances to the vinous fermentation may, according to M. Chaptal, be reduced to two; decoction and expression. The first is practised by means of water in the fermentation of the farinaceous grains, in making beer; the second is employed in the fermentation of juices which afford the different sorts of wine. The details furnished by the author on the preparation of beer we shall not notice, but proceed to those which relate to the art of making wine.

Vinous Fermentation of the Juice of the Grape.—The sugar and the ferment existing isolated in the grape, it becomes necessary to press this fruit to obtain from it the juice called *must*, in which these two vegetable principles are mixed together. This *must* speedily ferments at the temperature of 12° of Reaumur (about 60 of Fahrenheit). M. Chaptal says it is necessary to fill the vat all at once, in order to avoid the successive fermentations that take place when the must is put in at various times, as this circumstance renders the wine of a bad quality.

This may be the case indeed in countries to the north, where the grapes being very watery, and but little sweet, cannot support any derangement in the fermentation; but in these southern climates this phænomenon seldom shows itself. It must necessarily require many days to fill a vat which contains 50 muids, and yet, however, the wine is very excellent which is made in this enormously large vessel.

Before the must is put into the vat, this latter ought to be cleaned with the greatest care; then the liquor is to be left to ferment in it. According to M. Chaptal, the vinous fermentation is influenced by a variety of circumstances, into which I am successively to inquire.

Influence of Temperature on Vinous Fermentation.—Twelve degrees of Reaumur's thermometer appears to be the most suitable temperature for the vinous fermentation. Below this degree it languishes; above it, it becomes tumultuous. But it is not the temperature of the place only, where the fermentation is going on, which influences it; the abbé Rozier has proved that the temperature of the grapes, at the time of the vintage, has a considerable effect upon it, that the fermentation is always slow in proportion to the low temperature of the grapes when they are gathered. This phænomenon was observed last year at Montpellier. The vintage did not commence till the latter end of October, and the weather was cool; the must fermented badly in the vat, and the wine produced from it was not so strong; it appeared more tart than usual when it was tunned. This wine did not part with its bad qualities until it had undergone a new fermentation in the vessel, which continued some months.

One very singular circumstance, and which has been shown by M. Chaptal, is, the difficulty of restoring the temperature of must, when it is very low, so as to make the fermentation go on in a regular manner. "I diluted," says the author, "some extract of the must of grapes, with water at four degrees above the freezing point. I added some yeast of beer to accelerate the fermentation. The fermentation took place in a short time, when the temperature was elevated to 16 degrees, but it very soon diminished. A like quantity of extract diluted, and heated to the temperature of 16 degrees, for two days before the yeast was added to it, underwent a very regular and complete fermentation."

Influence of Air on the Vinous Fermentation.—In order that fermentation may take place, and go through its stages in a steady and regular manner, it is necessary that there be a free communication between the fermenting mass and the air. Should we not conclude from this fact, that the air enters as a principle into the product of this operation, or as an element of decomposition? The experiments of M. Chaptal contradict this conclusion, for he has never seen the air absorbed in the vinous fermentation. Its influence is confined to the facilitating the disengagement of the carbonic acid gass produced, the presence of which would check and even stop the fermentation. The free contact of air, although so useful in this respect, has, however, one disadvantage, that it occasions a considerable loss of aroma and alcohol. Thus it is well known that wine fermented in vessels nearly close, is often the most generous and of the most agreeable flavour. It is to secure these advantages without totally interrupting the communication with the air, that M. Chaptal advises to cover the vat with boards upon which is suspended a covering of old linen cloths;—an excellent method, and easily put in practice, as the cost of it is so trifling.

The loss of alcohol in the vinous fermentation is proved by the experiments of Dom Gentil, and by the happy application of them by M. Chaptal, in his manufactory of vinegar. It is also proved, probably, by the two following facts. Some white grapes found whole, by M. Coste, at the top of the vat in the time of tunning, tasted precisely like grapes preserved in brandy. M. Duportal also saw some grapes, under similar circumstances, entirely coated with small crystals of acidulated tartrite of potass. Do not these two phænomena show that the grapes had absorbed a portion of the alcohol which escaped during fermentation, and were thereby deprived of a certain quantity of their water of vegetation?

Influence by the Bulk of the fermenting Mass produced upon the Vinous Fermentation.—It is an incontestable fact, that the activity of the vinous fermentation is in proportion to the bulk of the mass. M. Chaptal has seen must contained in a cask, not finish its fermentation until the eleventh day, while a large tub, which contained twelve times the quantity, has completely fermented in four days; the heat of the liquor in the cask never exceeded seventeen degrees, while that in the large tub reached twenty-five. It will readily be conceived that the wine in the cask could not be so good as that in the large vessel, that the combination of the principles of the must could not be so perfect. However, a very large tub has one disadvantage: as the heat produced is so much greater, there is a greater volatilization of the alcohol and aroma, upon which the goodness of the wine so much depends.

Influence of the constituent Principles of Must upon the Vinous Fermentation.—Water, sugar, and the ferment, are the principles in must which produce the most considerable effect upon the vinous fermentation. Too large or too small a proportion of either of these principles equally impedes the operation. When the must contains too small a quantity of water, it undergoes but an incomplete fermentation, because the first portions of alcohol produced being too concentrated, preserve the sugar yet undecomposed from the action of the ferment. Whence results a very sweet and syrupy wine, like those of Spain. This inconvenience is to be remedied by the addition of water, which immediately restores the vinous fermentation. When the must is too watery, fermentation will scarcely take place, because the fermentable materials are too much diluted. In this case the wine produced is weak and almost colourless. The best mode of remedying this defect is to add some must evaporated to the 18th or 20th degree of Beaumé's hydrometer. M. Chaptal rightly observes, that care must be taken not to evaporate the must to the consistence of an extract; for then the leaven would be coagulated, and it would by this management be deprived of its property of producing fermentation. The evaporated must is to be added to the liquor in the tub until the whole liquor attains the ordinary consistence, which is between the eighth and fifteenth degrees of the same instrument.

Experience has proved the utility of this method: it has however this disadvantage, that the precipitation of tartar is more rapid, and by a natural consequence the colour of the wine is changed;—this at least is what takes place in Languedoc. This effect may, we think, be attributed to the precipitation of the tartar, which cannot remain dissolved in the additional portion of must, the first formed crystals of which attract others from the whole liquid by a molecular affinity. This precipitation being admitted, it is easy to conceive that the tartar, in falling down, carries with it the colouring matter upon which it acts as a mordant. Sugar being by itself one of the most effectual preservatives of substances, its excess in the must cannot but render the fermentation slow and incomplete: hence results a wine, in which is found a great deal of sugar undecomposed. In this case it is necessary to add some yeast to the must, so as to reestablish the proper proportion between the sugar and the ferment. The addition of tartar in a small quantity, as half a pound to 100 pounds of must, expediting the solution of it by boiling, is advised by M. Chaptal, who considers tartar as favouring the fermentation, and rendering the decomposition of the sugar more complete.

A deficiency of sugar presents a quick and regular fermentation, and only a meagre acescent wine is produced. This is to be remedied by adding wine already made, or honey, or, what is still better, molasses, brown sugar or white sugar, in the proportion of from five to ten parts to 100 of must,—if this method were allowable with us, otherwise than in theory.

This addition is particularly necessary when the fermenting principle is in excess in the must, as happens in cold countries and moist soils, where they make only weak sour wine, very susceptible of decomposition on account of the superabundance of the fermentable principle. On the contrary, this principle is sometimes prejudicial by its deficiency in the juice of some extremely sweet grapes. It is then proper to employ the methods proposed above, when there is an excess of sugar.

Progress of the Vinous Fermentation.—After having treated of the various causes which influence the vinous fermentation, M. Chaptal shortly traces the progress of this operation. He speaks of the intestine motion which gives rise to the formation of the crust called *chapeau de la vendage;* he makes mention of the heat and the disengagement of carbonic acid gass, which are constantly observable, and he points out the results of the operation. I shall say a word or two on the most remarkable of these.

Disengagement of Carbonic Acid Gass.—The production of carbonic acid gass during the vinous fermentation, is caused by the reaction of the elements of the sugar already altered by the ferment, and in which there is a subtraction of carbon and oxygen. The gass first produced is dissolved in the fluid; but as the formation of it goes on, an effervescence takes place from the disengagement of the gass, which soon spreads into the atmosphere, and mephitizes it, if the precautions pointed out by M. Chaptal are not employed.

If while the wine is yet fermenting it is inclosed in well stopped bottles, the carbonic acid gass is dissolved in the wine until this is saturated; then the fermentation is stopped by the pressure of the gass, which remains free in the empty space of the bottle, and the wine thus managed becomes very brisk and sparkling. This is the method practised in Champagne, where they pour off the wine several times, to separate the sediment which is thrown down. In Languedoc, they render the very sweet white wines sparkling, by putting some grains of corn into the bottles. These grains, doubtless, supply a ferment, which exciting a fresh fermentation, occasions a disengagement of carbonic acid gass.

But, as M. Chaptal remarks, it is not to the presence of carbonic acid gass only that sparkling wines owe their excellent qualities; they are also indebted for them to the aroma and a portion of alcohol, which the disengaged carbonic acid gass holds in solution. The ingenious idea of making vinegar with the gass taken from the top of fermenting vessels, proves this solution of alcohol; it is confirmed besides by M. Humboldt. Moreover, the impression which the substance in question makes upon our organs, leaves no room to doubt that it contains more than carbonic acid gass; it therefore never happens that we can exactly imitate it by a simple condensation of this gasseous body.

Formation of Alcohol.—In proportion as the sugar of the must, when acted on by the ferment, loses its carbon and oxygen, to form carbonic acid gass, it loses also some of its hydrogen, which combining anew with oxygen, separated from the sugar, forms water. These continual subtractions change the sugar into a particular product called alcohol; a word, M. Chaptal thinks, employed in a sense far too general. The quantity of alcohol produced is always in proportion to the quantity of sugar decomposed. A set of phænomena take place during its decomposition, which we shall not now notice. The result is an intoxicating liquor called wine, in which are found alcohol, water, mucilage, tartar, a colouring matter, &c. M. Chaptal says, the source of the colouring matter is in the pellicle of the grape, and that there is an analogy between it and resin: he observes, that it is only dissolved in the must during fermentation, in proportion as the alcohol is developed. It is an incontestable fact, that the colour of wine is always in proportion to the quantity of alcohol produced. But we do not know that we are to attribute the colouring of the wine solely to the solvent power of the alcohol. Our author notices a colour almost as black as ink, in the very weak wines of the banks of the Cher and the Loire; and it is not uncommon at Montpellier to eat very ripe grapes, whose juice is of a very red colour. In the year 1809 the must here was remarkably high-coloured at the time the grapes were pressed, and yet the wine made from it was of a paler colour, and not so strong as usual. Are not these positive facts conclusive against the colour of wine solely depending upon the alcohol acting on the pellicle of the grape?

DISTILLATION.

In the preceding chapter we have confined ourselves principally to the vinous fermentation produced from the juice of the grape. The process, however, is common to the saccharine matter of all other plants, or at least the differences are so small, that it is hardly worth while to detail them in a popular treatise. Under the article Rum we have touched upon the method employed in the case of melasses, and shall only further observe that, if barley or other grain be used, it is ground to a coarse powder, mashed, and the infusion fermented with yeast in large tuns; in which state it becomes a strong ale, and only differs from the malt liquors used for drinking in containing no hops or other bitter. The fermented liquor thus produced is called wash. In Scotland, the barley, when malted, is dried with peat, the smoke of which gives that peculiar flavour which is found in whisky, the spirit distilled from it.

The fermented liquor being thus obtained is introduced into the alembic, and the genuine process of distillation proceeds in the usual manner as described under that article. The alembic is commonly filled to about five-sixths of its capacity: when the wine boils the capital is put on, and all the joinings luted with a mixture of clay and ashes. Occasionally, various additions are made to the wash or wine, with a view either of increasing (as is supposed) the yield of spirit, or of correcting and keeping down the essential oil derived from the malt, which is apt to give it a nauseous flavour; or of regulating the boiling within the still, and preventing it from boiling over or running foul; or of neutralizing the acid generated during the fermentation, which remarkably lessens the product of spirit. For all these purposes soap is accounted the best addition, and large quantities of it are employed for this purpose in distilleries. Others, however, use alkalies alone.

During the distillation, whether of wine or of wash, the first spirit that comes over is oily and turbid, and often of a nauseous flavour, owing to the oil of the material employed which accompanies it in all those changes. The spirit afterwards runs clear, and continues so to the last, but constantly decreasing in strength, becoming more watery, and hence of less specific gravity.

Brandy.—In distilling grape-juice or wine for brandy, the first part that comes over is separated from what follows, and is fit for immediate use. The second part is called *seconda*, or *petite eau*, and is redistilled in the next process. The precise time at which this portion is begun to be collected is arbitrary, and differs in different countries. In some it is determined by the proportion of spirit already obtained to that of the wine put into the alembic; in other places by a certain specific gravity; in Spain and Portugal, the proof is established by the sinking of oil-olive in the spirit, for the less the specific gravity of the spirit the greater its strength;—and this is the method pursued for the same purpose in determining the strength of rum in the West Indies. The shape of the alembic or copper-boiler as used in France is cylindrical, about thirty French inches in height, and twenty-four in diameter, flattened at the bottom to present a greater surface to the fuel, and drawn out into a neck at the top about two inches high, and only nine or ten in diameter. It holds about 320 quarts. The capital, which fits on the neck of the alembic, has the form nearly of a very flattened cone, with the apex downwards, and truncated when it joins the alembic. It is joined to the boiler, and communicates by a beak or tube, in the usual manner, to the pewter serpentine, the diameter of which is about an inch and a half at its widest end. The alembic is filled with the wine to about five-sixths of its capacity; and it takes about nine or ten hours to run off this quantity.

Brandy is naturally clear and colourless as water, for the colour which it has in commerce is given partly by the casks in which it is kept, but chiefly by certain additions to the spirit, as sanders-wood, burnt sugar, &c. and which do not appear either to improve or injure its quality. The strength of the spirit is judged of by various means, which we shall notice presently, and shall here only observe, that its quality in this respect is a good deal judged of by the appearance of bubbles on the surface when brandy is shaken in a phial, by their size and degree of permanence: this last, however, is not to be depended upon, as it is capable of being imitated by certain well-known additions. The strength of the spirit depends necessarily on the strength of the wine, and this again upon the quantity of saccharine mucilage in the grape-juice, or basis of fermentation, which varies very much according to the soil, climate, and season, the kind of fruit and time of gathering. In general, this mucilage is most abundant in the warmest climates and seasons, and is much increased by lateness in gathering the crop. Such wines require a long and complete fermentation, and then they are rich, full-bodied, and spirituous. The very strongest wines yield about a third of their weight of proof-brandy; and the weakest, though well-fermented and perfect liquors, about a fifteenth. Chaptal estimates the average product from the wines of the south of France and Spain to be about a fourth. The lowest kind of brandy is obtained from the marc of grapes, or the residue of the fruit after the juice has been made to flow out by the action of the press: which often retains enough of the grape-juice to be brought into fermentation, and consequently, to yield a spirit when distilled. Thirty-two cubic feet of marc are reckoned in Switzerland to give about ten gallons of spirit, which, however, is rectified before it becomes very palatable. The flavour of the brandy depends upon several principles contained in the spirit, which rise with it on distillation; besides which, there are several foreign additions made to it by the manufacturer to suit his own purpose.

Corn-Spirits.—In the manufacture of corn-spirits it is not necessary to malt grain, in order to make it ferment sufficiently to yield a good spirit, and not only barley, but any other grain, will answer the same purpose. In our country, a mixture of barley and malt is usually preferred; in Holland the very finest geneva is made from wheat and malt, but more commonly from malt and rye, which latter yields more spirit than wheat; and a very great degree of care and attention should be employed in conducting the entire process. The usual method of making geneva is perhaps the following. A quantity of rye-flour coarsely ground, is mixed with a third or a fourth part of malt, and put into the fermenting tub with cold water, stirring it well with the hands to prevent the meal from clotting. Sufficient water is then added of a blood warmth, after which the ferment is mixed with the whole, which is composed of the yeast of former operations, dried and kept for a certain time. If the weather is favourable, and the heat well regulated, the fermentation begins in six hours and terminates on the third day, when the liquor becomes transparent, and assumes a hot pungent taste. The distillation is then proceeded upon immediately, as we have already described, before the liquor turns sour, which is avoided as much as possible. The distilling process is conducted very slowly, that the spirit may be as little as possible impregnated with the oil of the grain, to which much of the unpleasant flavour of the ordinary spirits is justly attributed. The first spirit is then rectified by a second distillation over juniper-berries, or in double geneva, by a third process. In some of the ordinary sorts, however, the juniper-berries are mixed with the fermenting materials, and one distillation suffices. And in the common geneva, or gin, as it is vulgarly called in our own country, the fine juniper flavour is coarsely imitated by turpentine.

Rum.—The manufacture of RUM, we have already noticed under that article, and it is only necessary to refer the reader to it.

The peculiar flavour of all distilled spirits is often destroyed or injured by a burnt taste, or what is called an empyreuma. This is less common to the first than to the second distillation; it possibly proceeds from an extrication of malic acid, and is usually in proportion to the violence of the heat made use of. The addition of chalk, alkali, or lime-water, keeps it down, but diminishes the proportion of the spirit. In some countries, however, this taste is admired, and has become fashionable.

Spirit of Wine, or *Alkohol.*—Any of the preceding spirits re-distilled, are said to be rectified, and by such re-distillation or rectification, are converted into spirits of wine, which, when in its purest state, or totally free from water, is denominated alkohol. The value of spirit of wine, therefore, depends upon its purity or strength: and one test of this, but an erroneous one, as we have already stated, consists in the size and permanency of its bubbles, when shaken in a phial. Another test is that of kindling it in a cylindrical silver cup, and noticing the quantity that has burnt before the flame dies away of its own accord. A third test is that of determining whether it will swim in olive oil; and a fourth by mixing with it a quantity of dried carbonat of potash, and observing the quantity of water which the alkali will attract and separate: but the only accurate method is that of ascertaining its specific gravity, which, when pure, according to Sir Charles Blagden's experiments, ought to be .825 at 60° of Farenheit. See HYDROMETER.

SPIRITUS. Spirit. In pharmacy, commonly implies the virtues of simples or other pharmaceutic materials, communicated to æthers or alkohols diluted with water, and usually, though not always, by the medium of distillation.

The chief preparations under this name are:

S. ÆTHERIS NITROSI. Spiritus nitrosi dulcis. Æther nitrosus. A febrifuge, diaphoretic, and diuretic compound mostly administered in asthenia, nervous affections, disuria, and calculous affections.

SPIRITUS ÆTHERIS VITRIOLICI. Spiritus vitrioli dulcis. Æther sulphuricus. A diaphoretic, antispasmodic, and tonic preparation mostly exhibited in nervous debility, and weakness of the primæ viæ.

S. ÆTHERIS VITRIOLICI AROMATICUS. An excellent stimulating and stomachic compound, which is administered in debility of the stomach and nervous affections.

S. ÆTHERIS VITRIOLICI COMPOSITUS. A stimulating anodyne, supposed to be the celebrated liquor mineralis anodynus of Hoffman. It is exhibited in fevers, nervous affections, hysteria, &c.; and in most cases of fever where medicines are rejected by the stomach this is of infinite service.

S. AMMONIÆ. Spiritus salis ammoniaci dulcis. A stimulating antispasmodic exhibited in cases of asphyxia, asthenia, and in nervous diseases.

S. AMMONIÆ COMPOSITUS. S. A. aromaticus. Sal volatile liquidus. A stimulating antispasmodic and sudorific in very general use to smell at in faintings and lowness of spirits. It is exhibited internally in nervous affections, hysteria, and weakness of the stomach.

S. AMMONIÆ FŒTIDUS. Spiritus volatilis fœtidus. A stimulating antispasmodic, often exhibited to children against convulsions, and to gouty and asthmatic persons.

S. AMMONIÆ SUCCINATUS. Eau de luce. Spiritus salis ammoniacæ succinatus. Liquor cornu cervi succinatus. This preparation is nothing more than a compound succinate of ammoniac, and therefore termed succinus ammoniacæ in the new chemical nomenclature. It is much esteemed as a stimulant and nervine medicine, and is employed internally and externally against spasms, hysteria, syncope, vertigo, and the stings of insects.

S. ANISI. S. ANISI COMPOSITUS. A stimulating carminative and stomachic calculated to relieve flatulency, borborygmus, colic, and spasmodic affections of the bowels.

S. CAMPHORÆ. A stimulating medicine only used as an external application against chilblains, rheumatism, palsy, numbness, and gangrene.

S. CARUI. This possesses the virtues of the carraway, and is mostly given as a dram, or in conjunction with other carminatives.

S. CINNAMOMI. Spirit of cinnamon is mostly used in conjunction with other carminatives to give a pleasant flavour; it may be exhibited alone as a carminative and stimulant.

S. CORNU CERVI. Liquid carbonate of ammoniac See LIQUOR VOLATILIS CORNU CERVI.

S. EBORIS. A liquid carbonate of ammoniac; it possesses similar virtues to the hartshorn. See LIQUOR VOLATILIS CORNU CERVI, and AMMONIA PREPARATA.

S. LAVANDULÆ. Though mostly used as a perfume, this spirit may be given internally as a stimulating nervine and antispasmodic.

S. LAVANDULÆ COMPOSITUS. An elegant and useful antispasmodic and stimulant, in very general use against nervous diseases, lowness of spirits, and weakness of the stomach, taken on a lump of sugar.

SPIRITUS LUMBRICORUM. The spirit obtained by the distillation of the earthworm is similar to hartshorn.

S. MENTHÆ PIPERITÆ. This possesses all the properties of the peppermint with the stimulating virtues of the spirit.

S. MENTHÆ VIRIDIS. This is most commonly added to carminative or antispasmodic draughts, and seldom exhibited alone.

S. MILLEPEDARUM. A fluid volatile alkali, whose virtues are similar to hartshorn.

S. MINDERERI. See AQUA AMMONIÆ ACETATA.

S. MYRISTICÆ. A stimulating and agreeable spirit possessing the virtues of the nutmeg.

S. NITRI DULCIS. See SPIRITUS ÆTHERIS NITROSI.

S. NITRI DUPLEX. The nitrous acid. See ACIDUM NITROSUM.

S. NITRI FUMANS. See ACIDUM NITROSUM.

S. NITRI GLAUBERI. See ACIDUM NITROSUM.

S. NITRI SIMPLEX. The dilute nitrous acid. See ACIDUM NITROSUM DILUTUM.

S. NITRI VULGARIS. This is now called acidum nitrosum dilutum. See ACIDUM NITROSUM DILUTUM.

S. PIMENTÆ. A stimulating aromatic tincture mostly employed with adstringent and carminative medicines.

S. PULEGII. This is in very general use as an emmenagogue amongst the lower orders. It possesses nervine and carminative virtues.

S. RAPHANI COMPOSITUS. S. ARMORACIÆ COMP. A very warm stimulating compound given in gouty, rheumatic, and spasmodic affections of the stomach and in scorbutic disorders.

S. RORISMARINI. A very fragrant spirit mostly employed for external purposes in conjunction with other resolvents.

S. SALIS AMMONIACI AQUOSUS. See AQUA AMMONIÆ.

S. SALIS AMMONIACI DULCIS. See SPIRITUS AMMONIÆ.

S. SALIS AMMONIACI SIMPLEX. See AQUA AMMONIÆ.

S. SALIS GLAUBERI. See ACIDUM MURIATICUM.

S. SALIS MARINI. See ACIDUM MURIATICUM.

S. VINOSUS RECTIFICATUS. Rectified spirit of wine is in general use to dissolve resinous and other medicines. It is seldom exhibited internally, though it exists in the diluted state in all vinous and spirituous liquors.

S. VINOSUS TENUIOR. Proof spirit, which is half the strength of rectified, is much employed for preparing tinctures of genuine resinous juices, barks, roots, &c.

S. VITRIOLI. See ACIDUM VITRIOLICUM DILUTUM.

S. VITRIOLI DULCIS. See SPIRITUS ÆTHERIS VITRIOLICI.

Spiritus volatilis fœtidus. See Spiritus ammoniæ fœtidus.

SPIRITU-SANTO, a seaport of Brasil, capital of a government of the same name, with a castle. Lon. 41. 0 E. Lat. 20. 10 S.

To SPIRT. *v. n.* (*spritta*, Swedish.) To spring out in a sudden stream; to stream out by intervals (*Pope*).

To Spirt. *v. a.* To throw out in a jet (*Gay*).

Spirt. *s.* (from the verb.) 1. Sudden ejection. 2. Sudden effort.

SPIRTING CUCUMBER. See Momordica.

To SPI′RTLE. *v. a.* (a corruption of *spirt.*) To shoot scatteringly (*Derham*).

SPI′RY. *a.* (from *spire.*) 1. Pyramidal (*Pope*). 2. Wreathed; curled (*Dryden*).

SPISS. *a.* (*spissus*, Latin.) Close; firm; thick: not in use (*Brerewood*).

SPI′SSITUDE. *s.* (from *spissus*, Latin.) Grossness; thickness (*Bacon*).

SPIT. *s.* (ꞅpıꞇan, Saxon; *spit*, Dutch.) 1. A long prong on which meat is driven, to be turned before the fire (*Wilkins*). 2. Such a depth of earth as is pierced by one action of the spade (*Mortimer*).

To Spit. *v. a.* preterit *spat*; participle passive *spit* or *spitted*. (from the noun.) 1. To put upon a spit (*Shakspeare*). 2. To thrust through (*Dryden*).

To Spit. *v. a.* (ꞅpœꞇan, Sax. *spytter*, Dan.) To eject from the mouth (*Shakspeare*).

To Spit. *v. n.* To throw out spittle or moisture of the mouth (*South*).

SPITAL, a town of Germany, in Carinthia, with a castle, seated on the Liser, near the Drave, 30 miles W. of Clagenfurt. Lon. 13. 37 E. Lat. 46. 53 N.

Spital, an ancient village in Lincolnshire, 11 miles N. of Lincoln. It was part of the Roman causeway, leading from London, by Lincoln, to the Humber. Here are two springs, one called Julian's Well, and the other Castleton Well. Great numbers of Roman coins have been dug up in this village.

Spi′tal. *s.* (corrupted from *hospital.*) A charitable foundation.

To SPI′TCHCOCK. *v. a.* To cut an eel in pieces and roast it (*King*).

SPITE. *s.* (*spijt*, Dutch.) 1. Malice; rancour; hate; malignity; malevolence (*Sid.*). 2. Spite *of* or *In* Spite *of*. Notwithstanding; in defiance of (*Rowe*).

To Spite. *v. a.* (from the noun.) 1. To mischief; to treat maliciously; to vex; to thwart malignantly (*Shakspeare*). 2. To fill with spite; to offend (*Temple*).

SPI′TEFUL. *a.* (*spite* and *full.*) Malicious; malignant (*Hooker*).

SPI′TEFULLY. *ad.* (from *spiteful.*) Maliciously; malignantly (*Waller*).

SPI′TEFULNESS *s.* (from *spiteful.*) Malice; malignity; desire of vexing (*Keil*).

SPITHEAD, a famous road between Portsmouth and the Isle of Wight, where the royal navy frequently rendezvous.

SPI′TTED. *a.* (from *spit.*) Shot out into length (*Bacon*).

SPI′TTER. *s.* (from *spit.*) 1. One who puts meat on a spit. 2. One who spits with his mouth. 3. A young deer (*Ainsworth*).

SPITTING OF BLOOD. See Hæmatemesis and Hæmoptysis.

SPI′TTLE. *s.* (corrupted from *hospital.*) A hospital (*Cleaveland*).

Spi′ttle. *s.* (ꞅpœꞇlian, Saxon.) Moisture of the mouth. See Saliva.

SPI′T-VENOM. *s.* (*spit* and *venom.*) Poison ejected from the mouth (*Hooker*).

SPITZBERGEN, the most northern country of Europe, being to the N. of Norway, between Greenland to the W. and Nova Zembla to the E. The coast is beset with craggy mountains, and in the winter it is continual night for four months. The animals are large white bears and white foxes. There are no settled inhabitants, and it is known only to those who go on the coast to fish for whales. See Greenland.

SPLACHNUM, in botany, a genus of the class cryptogamia, order musci. Capsule cylindrical, seated on a fleshy receptacle; fringe simple, of sixteen teeth, standing in pairs. Twenty species; of which fourteen are common to our own country.

SPLANCHNOLOGY. (*Splanchnologia*, σπλαγχνολογια; from σπλαγχνον, an entrail, and λογος, a discourse.) The doctrine of the viscera. See Anatomy.

SPLANCHNIC NERVE. The interior intercostal nerve. See Intercostal nerve.

To SPLASH. *v. a.* (*plasha*, Swedish.) To daub with dirt in great quantities.

SPLA′SHY. *a.* (from *splash.*) Full of dirty water; apt to daub.

To SPLAY. *v. a.* To dislocate or break a horse's shoulder-bone.

SPLA′YFOOT. *a.* (*splay* and *foot.*) Having the foot turned inward (*Pope*).

SPLA′YMOUTH. *s.* (*splay* and *mouth.*) Mouth widened by design (*Dryden*).

SPLEEN. *s.* (*splen*, Latin.) 1. The milt. It is supposed the seat of anger, melancholy, and mirth (*Wiseman*). 2. Anger; spite; ill humour (*Donne*). 3. A sudden motion; a fit (*Shakspeare*). 4. Melancholy; hypochondriacal vapours (*Pope*). 5. Immoderate merriment (*Shakspeare*).

Spleen. (*Splen*, σπλὴν.) Lien. The spleen or milt is a spongy viscus of a livid colour, and so variable in form, situation, and magnitude, that it is hard to determine either. Nevertheless, in a healthy man it is always placed on the left side, in the left hypochondrium, between the eleventh and twelfth false ribs. Its circumference is oblong and round, resembling that of an oval figure. It is larger, to speak generally, when the stomach is empty, and smaller when it is compressed evacuated by a full stomach.

It should particularly be remembered of this viscus, that it is convex towards the ribs, and concave internally: also, that it has an excavation, into which vessels are inserted.

It is connected with the following parts:

1. With the stomach, by a ligament and short vessels,

2. With the omentum, and the left kidney.

3. With the diaphragm, by a portion of the peritonæum.

4. With the beginning of the pancreas, by vessels.

5. With the colon, by a ligament.

In man the spleen is covered with one simple, firm membrane, arising from the peritonæum, which adheres to the spleen, very firmly, by the intervention of cellular structure.

The vessels of the spleen are, the splenic artery coming from the celiac artery, which, considering the size of the spleen, is much larger than is requisite for the mere nutrition of it.

This goes by serpentine movements, out of its course, over the pancreas, and behind the stomach, and after having given off branches to the adjacent parts, it is inserted into the concave surface of the spleen. It is afterwards divided into smaller branches, which are again divided into other yet smaller, delivering their blood immediately to the veins, but emitting it no where else. The veins, at length, come together into one, called the splenic vein, and having received the large coronary vein of the stomach, besides others, it constitutes the left principal branch of the vena portæ.

The nerves of the spleen are small; they surround the arteries with their branches; they come from the particular plexus, which is formed of the posterior branches of the eighth pair, and the great intercostal nerve,

Lymphatic vessels are almost only seen creeping along the surface of the human spleen.

The use of spleen has not hitherto been determined; yet if its situation and fabric be regarded, one would imagine its use to consist chiefly in detaining the blood for some space of time, dissolving it by its warmth, and rendering it more fluid.

Spleen-wort. See Asplenium.

SPLE′ENED. *a.* (from *spleen.*) Deprived of the spleen (*Arbuthnot*).

SPLE′ENFUL. *a.* (*spleen* and *full.*) Angry; peevish; fretful; melancholy (*Shakspeare*).

SPLE′ENLESS. *a.* (from *spleen.*) Kind; gentle; mild: obsolete (*Chapman*).

SPLE′ENY. *a.* (from *spleen.*) Angry; peevish; humorous (*Shakspeare*).

SPLE′NDENT. *a.* (*splendens*, Latin.) Shining; glossy; having lustre (*Newton*).

SPLE′NDID. *a.* (*splendidus*, Lat.) Showy; magnificent; sumptuous; pompous (*Pope*).

SPLE′NDIDLY. *ad.* (from *splendid.*) Magnificently; sumptuously; pompously (*Taylor*).

SPLE′NDOUR. *s.* (*splendor*, Latin.) 1. Lustre; power of shining (*Arbuthnot*). 2. Magnificence; pomp (*South*).

SPLE′NETIC. *a.* (*splenetique*, French.) Troubled with the spleen; fretful; peevish (*Tatler*).

SPLE′NETICS. (σπληνετικα.) Medicines which relieve diseases of the spleen,

SPLE′NIC. *a.* (*splenique*, Fr. *splen*, Latin.) Belonging to the spleen (*Harvey*).

SPLE′NISH, *a.* (from *spleen.*) Fretful; peevish (*Drayton*).

SPLENITIS, (ϛπληνιτις, from σπλην, the spleen.) Inflammation of the spleen. A genus of diseases in the class pyrexiæ and order phlegmasiæ of Cullen; characterized by pyrexia, tension, heat, tumour, and pain in the left hypochondrium, increased by pressure. This disease, according to Juncker, comes on with a remarkable shivering, succeeded by a most intense heat, and very great thirst; a pain and tumour are perceived in the left hypochondrium, and the paroxysms for the most part assume a quartan form, when the patients expose themselves for a little to the free air, their extremities immediately grow very cold. If an hæmorrhagy happen, the blood flows out of the left nostril. The other symptoms are the same with those of the hepatitis Like the liver, the spleen often is also subject to a chronic inflammation which often happens after agues, and is called the ague cake, though that name is also frequently given to a schirrous tumour of the liver succeeding intermittents. The causes of this disease are in general the same with those of other inflammatory disorders; but those which determine the inflammation to that particular part more than another are very much unknown. It attacks persons of a very plethoric and sanguine habit of body rather than others,

SPLE′NITIVE. *a.* (from *spleen.*) Hot; fiery; passionate: not in use (*Shakspeare.*)

SPLENIUS. In anatomy. (ϛπληνιος; from ϛπλην, the spleen; so named from its resemblance in shape to the spleen, or according to some it derives its name from *splenium*, a ferula, or splint, which surgeons apply to the sides of a fractured bone.) The splenius is a flat, broad, and oblong muscle, in part covered by the upper part of the trapezius, and obliquely situated between the back of the ear, and the lower and posterior part of the neck.

It arises tendinous from the four or five superior spinous processes of the dorsal vertebræ; tendinous and fleshy from the last of the neck, and tendinous from the ligamentum colli, or rather the tendons of the two splenii unite here inseparably; but about the second or third vertebra of the neck they recede from each other, so that part of the complexus may be seen.

It is inserted, by two distinct tendons, into the transverse processes of the two first vertebræ of the neck, sending off some few fibres to the complexus and levator scapulæ; tendinous and fleshy into the upper and posterior part of the mastoid process, and into a ridge on the occipital bone, where it joins with the root of that process.

This muscle may easily be separated into two parts. Eustachius and Fallopius were aware of this; Winslow has distinguished them into the superior and inferior portions; and Albinus has described them as two distinct muscles, calling that part which is inserted into the mastoid process and os occipitis, splenius capitis, and that which is inserted into the vertebræ of the neck, splenius colli. We have here followed Douglas, and the generality of writers, in describing these two portions as one muscle, especially as they are intimately united near their origin.

When this muscle acts singly, it draws the head and upper vertebræ of the neck obliquely backwards; when both act, they pull the head directly backwards.

SPLENOCELE. (ςπληνοκηλη; from ςπλην, the spleen, and κηλη, a tumour.) A rupture of the spleen.

SPLENT, or Splint. (from *splenium*, a ferula.) A thin scale of wood, pasteboard, or leather, of adequate shape and dimensions, which surgeons apply to the sides of a broken bone, to keep the ends in contact.

SPLENTS, in horses, are hard excrescences that grow on the shank-bone, and are of various shapes and sizes. Some horses are more subject to splents than others. Young horses are most liable to them, but they often wear off and disappear of themselves. Few horses put out splents after they are seven or eight years old, unless they meet with blows or accidents.

A splent that arises in the middle of the shank-bone is no way dangerous; but those that arise on the back part of this bone, when they grow large, and press against the back-sinew, always cause lameness or stiffness, by rubbing against it: the others, except they are situated near the joints, seldom occasion lameness.

As to the cure of splents, the best way is not to meddle with them, unless they are so large as to disfigure a horse, or are so situated as to endanger his going lame. On their first appearance, however, they should be well bathed with vinegar, or old verjuice, which, by strengthening the fibres, often puts a stop to their growth: for the membrane covering the bone, and not the bone itself, is here thickened; and, in some constitutions, purging and some diuretic drinks will be a great means of removing the thickening and moisture about the limbs, which are often the forerunners of such excrescences.

Various other remedies, however, are prescribed for this disorder; the usual way is to rub the splent with a round stick, or the handle of a hammer, and then to touch it with oil of origanum. Others lay on a pitch plaster, with a little sublimate or arsenic, to destroy the substance. Some use oil of vitriol; some tincture of cantharides: all which methods, however useless as to a cure, are apt to leave a scar with the loss of hair. Applications of a more caustic nature often do more hurt than good, especially when the splent is grown very hard. Mild blisters often repeated, as recommended in the case of a bone-spavin, should first be tried, as the most eligible method. These will generally succeed even beyond expectation; but if they fail, and the splent be near the knee or joint, apply the fire and blister, in the same manner as for the bone-spavin.

Splents on the back part of the shank-bone are difficult to cure, by reason of the back-sinews covering them: the practice is to bore the splent in several places with an iron, not very hot, and then to fire in the common way, not making the lines too deep, but very close together.

To SPLICE. *v. a.* (*splissen*, Dutch.) To join the two ends of a rope without a knot.

SPLINT. *s.* (*splinter*, Dutch.) A thin piece of wood, or other matter, used by chirurgeons to hold the bone newly set (*Wiseman*).

To Splint. *To* Spli'nter. *v. a.* (from the noun.) 1. To secure by splints (*Shaksp.*). 2. To shiver; to break into fragments.

SPLI'NTER. *s.* (*splinter*, Dutch.) 1. A fragment of any thing broken with violence (*Dryden*). 2. A thin piece of wood (*Grew*).

To Spli'nter. *v. n.* (from the noun.) To be broken into fragments; to be shivered.

To SPLIT. *v. a.* pret. and part. pass. *split.* (*spletten*, *splitten*, Dutch.) 1. To cleave; to rive; to divide longitudinally in two (*Cleave.*). 2. To divide; to part (*Atterbury*). 3. To dash and break on a rock (*Dryden*). 4. To divide; to break into discord (*South*).

To Split. *v. n.* 1. To burst in sunder; to crack; to suffer disruption (*Boyle*). 2. To burst with laughter (*Pope*). 3. To be broken against rocks (*Addison*).

SPLI'TTER. *s.* One who splits (*Swift*).

SPLUGEN, a town of the country of the Grisons, capital of the valley of Rheinwald, seated near the source of the Hinder Rhine, 42 miles S.W. of Coire.

SPLU'TTER. *s.* Bustle; tumult. A low word.

To SPOIL. *v. a.* (*spolio*, Latin.) 1. To seize by robbery; to take away by force (*Mil.*). 2. To plunder; to strip of goods (*Pope*). 3. To corrupt; to make useless (*Taylor*).

To Spoil. *v. n.* 1. To practise robbery or plunder (*Spenser*). 2. To grow useless; to be corrupted (*Locke*).

Spoil. *s.* (*spolium*, Latin.) 1. That which is taken by violence; plunder; pillage; booty (*Shakspeare*). 2. That which is gained by strength or effort (*Bentley*). 3. That which is taken from another (*Milton*). 4. The act of robbery; robbery (*Shakspeare*). 5. Corruption; cause of corruption (*Shakspeare*). 6. The slough; the cast-off skin of a serpent (*Bacon*).

SPOI'LER. *s.* (from *spoil.*) 1. A robber; a plunderer; a pillager (*South*). 2. One who mars or corrupts any thing.

SPOI'LFUL. *a.* (*spoil* and *full.*) Wasteful; rapacious (*Spenser*).

SPOKE. *s.* (ꞅpaca, Sax.) The bar of a wheel that passes from the nave to the felly (*Shakspeare*).

Spoke. The preterit of *speak.*

SPO'KEN. The participle passive of *speak.*

SPO'KESMAN. *s.* (*spoke* and *man.*) One who speaks for another (*Exodus*).

SPOLETTO, a duchy of Italy, 55 miles long and 40 broad; bounded on the N. by

Ancona and Urbino, on the E. by Naples, on the S. by Sabina and the patrimony of St. Peter, and on the W. by Orvieto and Perugino. It was formerly a part of Umbria, and is now subject to the pope.

Spoletto, an ancient town of Italy, capital of a duchy of the same name, with a bishop's see, and a castle. It suffered greatly by an earthquake in 1703, and now contains 12,000 inhabitants. Here are the ruins of an amphitheatre, a triumphal arch, and an aqueduct. It is seated in a country noted for good wine, near the river Tessino, 40 miles E. of Orvieto, and 60 N. by E. of Rome. Lon. 13. 6 E. Lat. 42. 45 N.

To SPO'LIATE. *v. a.* (*spolio*, Latin.) To rob; to plunder.

SPOLIA'TION. *s.* (*spoliatio*, Latin.) The act of robbery or privation (*Ayliffe*).

SPONDAULA. (from the Greek.) The name given by the ancients to a performer on the flute, or some similar instrument, who, while the sacrifice was offering, played to the priest some suitable air, to prevent his listening to any thing which might interrupt him in his duty.

SPONDEE, in the Greek and Latin prosody, a foot of verse consisting of two long syllables; as *vērtūnt*.

SPONDIAS. Jamaica plum-tree. In botany, a genus of the class decandria, order pentagynia. Calyx five-toothed; corol five-petalled; drupe with a five-celled nut. Four species, trees of the East or West Indies. One species, s. mombin, having leaves with the common petiole compressed, is cultivated under the name of purple hog-plum, or Spanish-plum: its usual height is ten or twelve feet; the stem of the size of a man's leg; flowers axillary, purple, appearing in the spring before the leaves. There is a variety called the leather-coat, from the appearance of its skin.

SPONDIASM. (Greek.) An alteration in the harmonic genus by which a chord was elevated three dieses above its ordinary pitch, so that the spondiasm was precisely the opposite of the eclysis.

SPO'NDYLE. *s.* (σπονδύλος.) A vertebræ; a joint of the spine (*Brown*).

SPONDYLIS, in the entomology of Fabricius, a tribe of the coleopterous genus Attabellus, which see.

SPONDYLUS, in zoology, a genus of the class vermes, order testacea. Animal a tethys; shell hard, solid, with unequal valves; one of the valves convex, the other flat; hinge with two recurved teeth, separated by a small hollow. Four species, all exotics; the chief of them, s. gædaropus, the shell slightly eared and spinous, inhabiting the Mediterranean, Indian, and some other seas, and found in infinite varieties as to thickness and colours; sometimes entirely purple, orange, white, or bloom-colour; sometimes marked with various streaks, spots, dots, or bands. See Natural Hist. Pl. CLXXV.

SPONGE, in helminthology. See Spongia.

Sponge tree, in botany. See Mimosa.

To Sponge. *v. a.* (from the noun.) To blot; to wipe away as with a sponge (*Hooke*)

To Sponge. *v. n.* To suck in as a sponge; to gain by mean arts (*Swift*).

SPO'NGER. *s.* (from *sponge*.) One who hangs for a maintenance on others (*L'Est.*)

SPONGIA. Sponge. In zoology, a genus of the class vermes, order zoophyta. Animal fixed, flexile, torpid, of various forms, composed either of reticulate fibres or masses of small spines interwoven together, and clothed with a gelatinous flesh full of small mouths on its surface, by which it absorbs and rejects water.

After having been regarded at different periods as an organized living substance of a doubtful kind, then as an inorganized substance, then as a vegetable, sponge is now advanced to the animal kingdom, and usually classed as we have arranged it above. So early as the days of Aristotle it was noticed by the persons employed in collecting it to shrink back when torn from the rocks, and was hence supposed to be in some way or other possessed of animal sensation: and this opinion, prevalent in the time of Aristotle, was still prevalent in that of Pliny.—For many ages afterwards, however, these naturalists appear to have been regarded as mistaken upon this subject, and sponges were again held to be altogether insentient substances. Marsigli, first, in modern times declared them to be entitled to the rank of vegetables; and Dr. Peysonell, towards the middle of the last century, sent two papers upon this subject to the Royal Society, both which are printed in its Transactions, in which he maintained that they were not vegetables, but animals; and pointed out what he conceived to be the mode of their growth and propagation. The idea had, indeed, been occasionally indulged for nearly half a century antecedently; but it was conceived too romantic and visionary for general adoption: and hence all the natural histories published at this period concur in the theory of Marsigli, and Bauhine, Lobel, Tournefort, Hill, and all the celebrated botanists of the day give them free admission into the vegetable kingdom, and describe them as submarine plants. Ellis, however, seems to have settled the point in 1762: his observations and experiments were chiefly made upon the spongia tomentosa; he satisfactorily ascertained the existence of the animal inhabitant; remarked its contraction within its cells when exposed to pain or injury; the expiration and inspiration of water through its tubes; and established the position that sponge is animal; and that the ends or openings of the branched tubes are the mouths by which it receives its nourishment and discharges its excrement: a position which chemistry has since abundantly supported by proving the ammoniacal property of the cellular matter of sponge.

There are forty-nine species of this zoophyte; of which the following are most worthy of notice.

1. S. coronata. Crowned sponge. Minute;

consisting of a single tube, and crowned at the tip with a ray of spines. Inhabits the Sussex coast; pale yellow; the rays that compose the crown bright pearl colour, hollow and open at the top, and when magnified appears covered with little rising points.

2. S. officinalis. Common sponge. Irregularly formed, porous, tough, lobed, woolly. Inhabits the Archipelago, Mediterranean and Indian seas, adhering to rocks by a broad base, and is often found inclosing small stones, shells, and particles of sand. Varieties of marine animals pierce and gnaw it into irregular winding cavities, which appear on the outside by large holes higher than the rest; its colour varies from a pale to a deep yellow; the internal part, when cut perpendicular, consists of small tubes composed of reticulate fibres, and ending on the outside in an infinite number of small circular holes, which are the bibulous months of the animal, each of which is surrounded by a few erect pointed fibres. This is the common sponge of the shops.

3. S. tomentosa. Downy sponge. Stinging sponge. Porous, irregularly formed, brittle, soft, downy, interwoven with minutest spines. Inhabits the British, African, and Indian coasts, adhering to marine substances; when fresh, of a bright orange colour, and full of gelatinous flesh, when dry, whitish and very light, and if broken resembles the crumb or soft part of bread. It appears to be composed of a number of minute spines, and upon handling stings or raises blisters like cowitch.

4. S. botryoides. Grape sponge. Very tender, branched, covered with bunches of ovate tubercles open at the top. Inhabits the British coast; bright, shining, white; the bunches made up of oblong oval tubercles, like grapes open at the end; the surface, when highly magnified, seems covered with masses of three-rayed spinous stars.

5. S. lacustris. Lake sponge. Creeping, brittle, with erect, round, obtuse branches. Found at the bottom of lakes in England and Sweden; covered with scattered pores, in which are sometimes found, during autumn, small blueish shining globules.

6. S. fluviatilis. River sponge. Green, erect, fragile, of many irregular branches. Inhabits fresh waters in England, Prussia, and some other parts of Europe; dull green, with hardly the appearance of animal life, of a fishy smell, and with the pores full of green gelatinous granulations. Very much resembles the last.

7. S. cristata. Cock's-comb sponge. Flat, erect, soft, with rows of small pores a little projecting along the top. Inhabits the British shores, adhering to rocks; generally two inches high and three long; yellowish, and growing in the shape of a cock's-comb.

8. S. bacillaris. Irregularly formed, caulescent, erect, with appressed, porulous branches. Inhabits the Norway sea; one and a half foot high, and about the thickness of a finger; round, of the consistence of common sponge, but more compact, with very numerous pores, appearing as if perforated by a very fine needle.

Sponge has been chemically analyzed by Mr. Hatchett, and his results are given in his valuable paper on the component parts of animal membrane in the Philosoph. Transact. for 1800.

When sponge has been immersed in dilute nitric acid for a fortnight, the acid becomes pale yellow, and is changed to an orange by pure ammonia. After which process it becomes more or less transparent, and considerably softened, and is then completely soluble in ammonia into a deep orange-coloured liquor. When digested with boiling distilled water, sponge gives out a portion of gelatin, which is precipitated by infusion of oak-bark. By losing this gelatin it becomes less flexible than before; it is easily torn when moist, and crumbles between the fingers when dry. In its natural state, but more especially when deprived of its gelatin by long boiling in water, if boiled in caustic alkali it completely dissolves and forms an animal soap. Heated in a close vessel it gives out an ammoniacal fetid smoke, and is reduced to a black charcoal, which, after incineration, leaves a small quantity of common salt, and some carbonat of lime.

The constituent ingredients of sponge, therefore, are animal gelatin, and that condensed albumen which Mr. Hatchett has found to be the principal part of all soft membranous organs, of cartilage, &c. The former is dissolved, though with some difficulty, in boiling water, but does not yield to cold water; the albumen is insoluble in water at any temperature, but yields to caustic alkali. Hence sponges only differ from the horny stems of gorgoniæ, and from antipathes, by being of a finer and more closely woven texture. In reality, the coarser sponges, as s. cancellata, have a near approach to the nice reticulated parts of the finer gorgoniæ, as for instance g. flabellum, and evince an external as well as internal similarity.

Spongia usta. Burnt sponge. This preparation is exhibited with bark in the cure of scrophulous complaints, and forms the basis of a lozenge which has been known to cure the bronchocele in many instances.

SPO'NGINESS. *s.* (from *spongy.*) Softness, and fulness of cavities, like a sponge (*Harvey*).

SPO'NGIOUS. *a.* (from *sponge.*) Full of small cavities like a sponge (*Cheyne*).

SPO'NGY. *a.* (from *sponge.*) 1. Soft and full of small interstitial holes (*Bacon*). 2. Wet; drenched; soaked; full like a sponge (*Shakspeare*).

SPONHEIM, a town of Germany, capital of a county of the same name, in the circle of Upper Rhine, 27 miles W. of Mentz, and 46 E. of Treves. Lon. 7. 21 E. Lat. 49. 54 N.

SPONK. *s.* Touchwood.

SPO'NSAL. *a.* (*sponsalis*, Latin.) Relating to marriage.

SPO'NSION. *s.* (*sponsio*, Latin.) The act of becoming surety for another (*Ayliffe*).

SPONTANE'ITY. *s.* (*spontaneitas*, Latin.) Voluntariness; willingness; accord uncompelled (*Bramhall*).

SPONTA'NEOUS. *a.* (from *sponte*, Latin.) Voluntary; not compelled; acting without compulsion or restraint (*Hale*).

SPONTANEOUS VITALITY. The production of plants or animals by other means than those of ordinary or parental generation, and hence formerly denominated ambiguous or equivocal generation. This doctrine was at one time discredited as impious, and having a tendency to controvert the established laws of order, and support the absurd cause of eternal and universal fortuitousness. Nothing, however, can be more illogical; for whether the doctrine be true or false, it only supposes that, amidst the various plans devised by nature, or the great Author of nature, for giving population to the different elements of earth, air, and water, we are not yet acquainted with all of them, and still less with the laws by which all of them are regulated and upheld. For admitting that, under peculiar circumstances, some of the lowest kinds of the lowest classes of animals or vegetables may originate from the concurrence of peculiar molecules of matter, yet there may be, and if the fact exists at all, there unquestionably is, as much order and predetermination in the preparation of those peculiar molecules, and the arrangement of those peculiar circumstances, as in the structure of sexual organs, and the intervention of sexual commerce: or the solitary power by which animals and plants that are altogether destitute of sex, are capable of reproduction out of the molecules of their own system, through the medium of buds and bulbs of slips and cuttings. A superintending or all-directing providence is just as requisite in the one instance as in the other, and the laws of operation must necessarily be just as certain and precise, whether we be acquainted with them, or whether we be not.

This very ancient doctrine is generally conceived to have been of Egyptian birth; it was adopted by most of the philosophical schools of Greece and Rome, and entered very extensively into the popular mythology of the poets. Hence, when Ovid, who has copied from Hesiod his account of the antediluvian ages of the world, relates at length the destruction of every species of animals by the deluge, with the single exception of Deucalion and Pyrrha, he supposes the whole human race to be re-produced, and this too in obedience to the command of the oracle consulted on the occasion, not by sexual intercourse of the surviving pair, but by casting the stones of the earth backwards over their shoulders, which suddenly softened, and grew into human figures; for observes he,

> Magna parens terra est; lapides in corpore
> terræ
> Ossa reor dici.
>
> Our mighty mother is the earth; the stones
> Upon her surface, doubtless are her bones.

In this fact, however, we trace at least the co-operation of man and woman in the reproduction of the human race. But nothing of the kind occurred, according to the same tradition, in the renewal of every other tribe of animals. For the poet shortly proceeds to inform us that,

> Cætera diversis tellus animalia formis
> Sponte sua peperit; postquam vetus humor ab
> igne
> Percaluit solis; cœnumque, udæque paludes
> Intumuêre æstu; fœcundaque semina rerum
> Vivaci nutrita solo, ceu matris in alvo,
> Creverunt, faciemque aliquam cepêre morando.
>
> All other tribes, howe'er diverse of make,
> Earth bore spontaneous; and as down direct
> Th' established sun his radiant ether threw,
> And the foul slime, the stagnant marsh below
> Swell'd with his fire, the genial seeds of things
> New bulk assum'd, new forms of life display'd.

The epicureans, stoics, and almost all the other schools of philosophy, gave a somewhat similar account of the origin of animal life at the beginning; and many of them contended that, among the lower kinds, such was the common mode by which they were reproduced from age to age. So Lucretius, lib. ii. 870.

> Quippe videre licet, vivos exsistere vermeis
> Stercore de tetro, putorem quam sibi nacta est,
> Intempestivis ex imbribus humida, tellus.
>
> Thus into life th' insensate dung-hill rears
> The race of worms, when once the mingling
> show'r
> Wakes the warm ferment through the putrid
> mass. GOOD.

Whence Thomson, in his Summer, 287.

> Full nature swarms with life; one wond'rous mass
> Of animals, or atoms organiz'd,
> Waiting the vital breath, when parent heaven
> Shall bid his spirit blow.

And Darwin, who has pressed the same doctrine in his physiological principles to an extent that cannot be supported. Templ. of Nat. i. 247.

> Hence, without parent, by spontaneous birth,
> Rise the first specks of animated earth;
> From nature's womb the plant or insect swims,
> And buds or breathes, with microscopic limbs.

"Aristotle," observes Mr. Good, in his note on the above passage from Lucretius, "strenuously contended for this power of spontaneous generation; and having had the good fortune to become more popular throughout every European state, after the dissemination of the Christian religion, than any other philosopher, this doctrine likewise descended with his general code of tenets, till about a century ago the whole fabric sustained a severe assault from the united labours of Des Cartes, Bayle, Malbranche, and Newton, who maintained that all animal life must necessarily be propagated by sexual commerce alone, and be continued either viviparously or oviparously.

"But by experiments and observations that have since been made, and that with the most undeviating attention, it should seem that these are not the only means by which life is generated: that sexual commerce is by no means absolutely necessary in every instance, and that succeeding races are propagated by modes altogether as numerous and as diverse as in the vegetable world. The resemblance, in this respect, between the two departments, is indeed most striking and astonishing; and it is equally certain in both cases that, although sexual intercourse, and oviparous and viviparous gestation, the medium I mean of seeds and bulbs or buds in the vegetable kingdom, and eggs and living fetuses in the animal, are generally employed by nature for this purpose, yet in each department there are also other modes of propagation, by no means unfrequently adopted. The armed polype, or hydra of Linnéus, multiplies its species like the water-lentil, by sending off lateral shoots from the body of the parent reptile. The bell-polypus, or hydra stentora, increases by splitting longitudinally; and these divisions, and every succeeding race of divisions, continue to re-split every twenty-four hours, till the original stock in a few days produces an innumerable offspring. The funnel-shaped polypus multiplies by splitting transversely; and every species of it, as well as many other animals of the order gymnarthridia, as the asterias, and hirudo viridis, may be propagated by sections with as much ease as the most simple plant whatever; and these sections may be perpetually renewed without the failure of an individual part. The dart millepes affords increase by a spontaneous separation, about two-thirds below the head, into two distinct and perfect animals, and we know of no other mode by which it can continue its species. The animalcules found in infusions of animal and vegetable substances, and indeed, in all microscopic animalcules, multiply by continued divisions and sub-divisions, something in the same manner; and various minute experiments of Saussure sufficiently prove, that sexual copulation, even if a difference of gender subsists among them, which has never been traced, and in all probability does not subsist, has no effect in the present instance: for animalcules of this class taken away, on the moment of separation from the parent insect, and put separately into distinct drops of water, still continue to exhibit the same prolific property without any diminution of power. There is another species mentioned by Bonnet, as existing in the infusion of hempseed, that divides crosswise, and separates in every new generation, into four distinct and perfect animals at the same time. It is probable that all these are without sexual distinctions; and notwithstanding the general adherence of the disciples of Linnéus to a contrary doctrine, it is equally probable that a vast variety of vegetables exist, which are in like manner devoid of sexual character. The bread-fruit tree of Otaheite, arto-carpus incisus of Linnéus, is a case completely in point; the propagation of which is highly curious and entertaining, but would occupy too much space to be minutely described in the present note. And although such sexual characters have been traced among many plants inserted by the Swedish naturalist in the order cryptogamia, since his decease, yet it is a very numerous order still, and I apprehend, will ever continue so. Many vegetables have a power of propagating both by seeds and bulbs as well as buds, at the same time; that is, oviparously and viviparously: and the aphis puceron, or vine-fretter, has been detected by Bonnet to possess a power perfectly similar, its young being viviparous in the full heat of summer, and oviparous in the latter and more chilly months of autumn. There are various families of flies that are supposed to be equally gifted.

" The capability of ingrafting is not peculiar to vegetables, the fresh water polypus and the sea-nettle (actinia) will endure the process with an equal degree of ease and effect.

" The young of many animals are brought into the world in a state of extreme imperfection; without the sense of sight, or the use of thei limbs; in other instances, they are able to assist themselves from the moment of their birth. So while the seeds of most plants fall upon the earth in a dormant state, and require much care to render them productive, in the festuca vivapara, and a few others, they begin to vegetate in the parent plant, and drop upon the soil with roots ready formed, perfect in all their powers, and capable of immediate increment.

" Most plants that are propagated by sexual connexion possess hermaphrodite corols; that is to say, every individual corol possesses both the male and female organs of generation in itself. The corol of the cucumber, however, as well as all other plants of the class monœcia, are male and female separately, and require the conjoint faculties of the two to propagate their kind. There are other plants again, that are male or female through every flower produced: and of consequence, unless the female herb be situated in the vicinity of the male, it will be barren through the whole term of its existence. Such is the order diœcia of Linnéus. Among animals we seldom meet with more than the organs of a single sex attached to each individual. Reports of hermaphrodites have not been uncommon, indeed, both amidst quadrupeds and mankind; and nature certainly appears to have sported occasionally in this way, but never in such a manner as to have rendered a possession of the two sexes perfect in the same subject. But the earth-worm, dew-worm, snails, eels, oysters, and many other species of shell-fishes, are complete hermaphrodites; and the number of animals of this class is so considerable, that M. Poupert believes it to exceed that of those which are divided into sexes. See Mem. de l'Acad. des Sciences. While these propagate their kinds from their own single exertions, there are other shell-fishes, as we learn from Mr. Adanson in his account of Senegal, that require the union of not less than three individuals for the same genial purpose. In like manner, it has lastly been proved by M. Girtanner, that the conferva fontinalis, first noticed by Dr. Priestley, requires heat, light, and water, though nothing else, for the production of this vegetable.

" The hermaphrodite power of many of the animals here enumerated has been long known to the world. It is mentioned by Homer and Athenæus, but more particularly in the following verses of Oppian.

> Αλλ᾽ ουκ εγχελυεσσιν ὁμοπον, ουδε χελοναις
> Ουτ᾽ ουν πολυποδεσσι γαμου τελος, ουτε κελαινη
> Μυραινη, λεχεων δε παρατροπον αισαν εχουσιν.
> Αι μεν γαρ σπειρηδον επ᾽ αλληλεσι χυθεισαι
> Εγχελευες, δεμας ὑγρον αναστρωφωσι θαμειαι.

Not thus conchs, eels, and polypi embrace,
Nor purple lampreys rear their embryo race.
In selfish coils, hermaphrodite they sit,
And their own powers the vital spume emit,
Which gradual dropp'd on sands or slimy mud,
A silver offering render to the flood.

" Spalanzani detected many vegetable seeds extremely diminutive in their form, the vitality of which it is almost impossible to destroy either by heat or chemical solvents. In like manner, he discovered the eggs of many animalcules confined in the vegetable seeds, still possess a power of producing their definite order of insects, after such seeds had been exposed to the most intense heat of burning coals, and even the blow-pipe itself; and although reduced into the most subtle powder, after having hereby been converted into calces. Thus, too, many animals and vegetables have an equally wonderful power of resuscitation after apparent destruction: among the latter may be mentioned the nostoc and tremella, which perpetually spring up after they have seemed to perish; and among the former the chaos redivivum, the vorticella, or wheel-animal, the sloth, and tile-eel, a new species discovered by Spalanzani, in the impalpable dust of bricks and tiles. In the case of this last insect, the alternate process of death and resurrection was carried on with success, and with the same animalcule, for not less than eleven times, by keeping it dry and without sand, and afterwards moistening it with water. Eggs and seeds, after a torpor of months or even years are occasionally revived, on being moistened with warm water; and in like manner, some shell-snails in the cabinets of the curious have revived on the same application, after having been kept in a dry state for ten or twelve years.

"It was in consequence of such experiments, that the Count de Buffon established a system which appears strongly inclined to resuscitate the doctrine of equivocal generation contended for by Lucretius. According to this celebrated naturalist, all matter swarms with organic germs or molecules, which serve for the nutriment of organised bodies, till they acquire a state of maturity, and augmentation ceases; and for their seminal stores afterwards. But independently of seminal secretion, he contends, that where large quantities of these prolific germs are collected in any part of an animal body, wherever such germs are compelled to remain together, they create certain orders of living beings, which have always been regarded as real animals. The tænia, the ascarides, all the worms found in the veins, in the liver, in wounds, in pus, and most of those discovered in putrid flesh, have, according to the system, no other origin. The eels in paste and vinegar, the tadpoles in the male semen, and all the pretended microscopic animals are only different forms assumed, according to circumstances by this active matter, which has a perpetual tendency to organization. Hist. Naturelle, tom. iii.

"When the conferva fontinalis, or green matter that grows at times so rapidly upon the surface of stagnated waters, was first discovered by Dr. Priestley; and I believe still later, when the mucor, or mouldiness, which was first observed by Mr. Ellis, to grow on the surface of all putrifying vegetable or animal matter, it was the fashion to suppose that these vegetable substances were produced from seeds floating in the atmosphere, and hence deposited on the waters or putrefactions, where they were generated. But the experiments of Dr. Ingenhousz have long falsified this idea; and these have since been confirmed by some very curious and important ones by M. Patun, who has completely succeeded in establishing the spontaneous generation of these very simple and newly discovered vegetables. See Nouveau Dictionnaire d'Histoire Naturelle appliquée aux Arts, tom. xiv. Dr. Darwin, who never suffered a system to lose any thing when once imbibed by himself, seems to have carried this of spontaneous vitality to a most immoderate extreme. The reader may form some idea of its extravagance from the following passage, with which he concludes one of his essays upon this subject. 'But it may appear too bold in the present state of our knowledge on this subject, to suppose that all vegetables and animals now existing, were originally derived from the smallest microscopic ones formed by spontaneous vitality; and that they have by innumerable reproductions, during innumerable centuries of time, gradually acquired the size and excellence of form and faculties which they now possess; and that such amazing powers were originally impressed on matter and spirit by the great Parent of parents, Cause of causes! Ens Entium!'"

Before we close this article we should observe, that M. Fray of Paris has lately published various experiments in satisfactory disproof of the hypothesis, which ascribes the production of animalcules found in the infusion of plants that has grown putrid, to its absorption of the eggs of such animalcules floating invisibly in the atmosphere. We take the following sketch of M. Fray's pursuits upon this subject from Nicholson's Journal, vol. xxxii. p. 165.

On the 8th of Nivose, 5, (Dec. the 28th, 1796), he took a glass globe, that would hold about six common bottles of liquid; well rinsed it with distilled water; and then filled it with water, which he had just distilled a second time. Having inverted it on a pneumatic trough, he expelled about five-sixths of the water by introducing first a portion of oxygen gass, and then three times as much hydrogen gass. He then corked the globe in the trough with a cork that fitted it very tight; and tied a piece of wet bladder over the cork as soon as it was taken out. When this bladder was dry he covered it with putty, and tied another piece of bladder over this. The globe thus prepared he placed in very hot dung, into which it was sunk to the level of the water, and covered it with a frame. On the 9th of January he removed the frame, and examined the globe. No alteration was perceptible. On the 24th it was in the same state; but, the heat of the bed having diminished, some fresh hot dung was added; care being taken to agitate the globe as little as possible in moving it. On the 8th of February the water appeared not perfectly limpid; but no pellicle, or distinct substance of any kind, was perceptible. On the 26th, as soon as the frame was removed, the water appeared greenish. On a closer inspection long vegetations of a beautiful green colour were perceived ramifying in all directions on the bottom and sides of the vessel. Several, that were of a larger size, but less green, were suspended in the water, and had a mucous appearance. Mr. Fray now removed the globe to the window of his study. On the 1st of March he opened the window, the sun then shining on the globe, and perceived here and there on the summits of the vegetations, little insects, moving about pretty quickly. He counted ninety-six, moving in various directions. They were all of the same species; and he soon discovered that they were of the genus podura. For a few days their number increased, and they were more brisk in their motions: but in about three weeks, or less, their motion had ceased; and they were dead. Their bodies soon changed colour, and became of a whitish gray.

As soon as the sun had acquired some power, the green matter gradually grew pale. At length it disappeared entirely, its filaments were decomposed, and all this organic and vegetable matter was precipitated to the bottom of the water, where it formed a very white mucous sediment. After some months the surface of the water was covered pretty copiously with an oily matter. On opening the globe a slight smell of mouldiness was perceived.

A drop of the water, with a little of the pellicle swimming on it, being taken up with the point of a toothpick, and examined with the microscope, it exhibited an immense number of globules of various sizes, almost all motionless: in every drop of water however one or two were perceived that had a very slow motion.

Mr. Fray made several experiments of a similar kind, all of which afforded curious results, and he intended to continue them.

SPONTA'NEOUSLY. *ad.* (from *spontaneous.*) Voluntarily; of its own accord (*Bent.*).

SPONTA'NEOUSNESS. *s.* (from *spontaneous.*) Voluntariness; freedom of will; accord unforced (*Hale*).

SPOOL. *s.* (*spohl*, Dutch.) A small piece of cane or reed, with a knot at each end; or a piece of wood turned in that form to wind yarn upon; a quill.

To SPOOM. *v. n.* To go on swiftly (*Dry.*).

To SPOON. *v. n.* In sea language, is when a ship, being under sail in a storm, cannot bear it, but is obliged to put right before the wind (*Bailey*).

Spoon. *s.* (*spaen*, Dutch.) A concave vessel with a handle, used in eating liquids (*Pope*).

Spoon-bill, in ornithology. See Platalea.

SPO'ONFUL. *s.* (*spoon* and *full.*) 1. As much as is generally taken at once in a spoon. A medical spoonful is half an ounce (*Bacon*). 2. Any small quantity of liquid (*Arbuthnot*).

SPO'ONMEAT. *s.* (*spoon* and *meat.*) Liquid food; nourishment taken with a spoon (*Dryden*).

SPO'ONWORT. *s.* Scurvygrass. See Cochlearia.

SPORADES, in astronomy, a name by which the ancients distinguished such stars as were not included in any constellation. These the moderns more usually call unformed, or extra-constellary stars.

Many of the sporades of the ancients have been since formed into new constellations: thus, of those between Ursa Major and Leo, Hevelius has formed a constellation named Leo Minor; and of those between Ursa Minor and Auriga, he also formed the Lynx; and of those under the tail of Ursa Minor, another called Canis Venaticus, &c.

SPORADIC. (Σποραδικος; from σπειρω, to sow.) An epithet for such diseases as seize particular persons, at the same time or season. Diseases dispersed sparingly, and not contagious; seizing particular persons of the same clan, family, or locality, and prætermitting others as though by selection.

SPORT. *s.* (*spott*, a make-game, Islandic.) 1. Play; diversion; game; frolic and tumultuous merriment (*Sidney*). 2. Mock; contemptuous mirth (*Tillotson*). 3. That with which one plays (*Dryden*). 4. Play; idle gingle (*Broome*). 5. Diversion of the field, as of fowling, hunting, fishing (*Clarendon*).

To Sport. *v. a.* (from the noun.) 1. To divert; to make merry (*Sidney*). 2. To represent by any kind of play (*Dryden*).

To Sport. *v. n.* 1. To play; to frolic; to game, to wanton (*Broome*). 2. To trifle (*Tillotson*).

SPO'RTFUL. *a.* (*sport* and *full.*) 1. Merry; frolic; wanton (*Milton*). 2. Ludicrous; done in jest (*Bentley*).

SPO'RTFULLY. *ad.* Wantonly; merrily.

SPO'RTFULNESS. *s.* (from *sportful.*) Wantonness; play; merriment; frolic (*Sid.*).

SPO'RTIVE. *a.* (from *sport.*) Gay; merry; frolic; wanton; playful; ludicrous (*Pope*).

SPO'RTIVENESS. *s.* (from *sportive.*) Gayety; play; wantonness (*Walton*).

SPO'RTSMAN. *s.* (*sport* and *man.*) One who pursues the recreations of the field (*Add.*).

SPO'RTULE. *s.* (*sportule*, French; *sportula*, Latin.) An alms; a dole (*Ayliffe*).

SPOT. *s.* (*spette*, Danish; *spotte*, Flemish.) 1. A blot; a mark made by discoloration (*Dryden*). 2. A taint; a disgrace; a reproach (*Pope*). 3. A scandalous woman (*Shaksp.*). 4. A small extent of place (*Addison*). 5. Any particular place (*Otway*). 6. *Upon the* Spot. Immediately; without changing place (*Swift*).

Spots in the sun. See Sun.

To Spot. *v. a.* (from the noun.) 1. To mark with discolorations; to maculate (*Tate*). 2. To patch by way of ornament (*Addison*). 3. To corrupt; to disgrace; to taint (*Abbot*).

SPO'TLESS. *a.* (from *spot.*) 1. Free from spots. 2. Free from reproach or impurity; immaculate; pure; untainted (*Waller*).

SPOTSWOOD (John), archbishop of St. Andrews, was educated at Glasgow, and attended as chaplain the duke of Lenox, in his embassy to France, and followed James I. when he took possession of the English throne. That year he was made bishop of Glasgow, and privy counsellor of Scotland, and in 1615 was translated to St. Andrew's. In 1633, he crowned Charles I. as king of Scotland at Holyrood-house, and in 1635 was made chancellor of the kingdom. He retired to England, where he sunk under his infirmities, 1639. He wrote an history of the church of Scotland begun at the command of James I. and it is regarded as accurate.

SPO'TTER. *s.* (from *spot.*) One that spots; one that maculates.

SPO'TTY. *a.* (from *spot.*) Full of spots; maculated (*Milton*).

SPOU'SAL. *a.* (from *spouse.*) Nuptial; matrimonial; conjugal; connubial; bridal (*Shakspeare*).

Spou'sal. *s.* (*espousailles*, French; *sponsalia*, Latin.) Marriage; nuptials (*Dryden*).

SPOUSE. *s.* (*spousa*, Latin; *espouse*, Fren.) One joined in marriage; a husband or wife (*Shakspeare*).

SPOU'SED. *a.* (from the noun.) Wedded; espoused; joined together as in matrimony (*Milton*).

SPOU'SELESS. *a.* (from *spouse.*) Wanting a husband or wife (*Pope*).

SPOUT. *s.* (from *spuyt*, Dutch.) 1. A

pipe, or mouth of a pipe or vessel, out of which any thing is poured (*Brown*). 2. Water falling in a body; a cataract (*Shakspeare*).

Spout (Water). See Water-spout.

Spout-fish. See Solen.

To Spout. *v. a.* (from the noun.) To pour with violence, or in a collected body, as from a spout (*Bacon*).

To Spout. *v. n.* To issue as from a spout (*Woodward*).

To SPRAIN. *v. a.* (corrupted from *strain.*) To stretch the ligaments of a joint without dislocation of the bone (*Gay*).

Sprain. *s.* (from the verb.) Extension of the ligaments without dislocation of the joint (*Temple*).

SPRAINTS. *s.* The dung of an otter.

SPRANG. The preterit of *spring.*

SPRAT, in ichthyology. See Clupea.

Sprat (Thomas), a prelate, born at Tallaton, Devonshire, 1636, and educated at Wadham College. He published in 1659 his poem on the death of Cromwell, dedicated to Wilkins. He afterwards wrote the plague of Athens, a poem, and another on the death of Cowley. After the restoration he was chaplain to Buckingham, and then to the king. He promoted the establishment of the Royal Society, of which he was one of the first members, and of whose labours he published the history, 1667. He next wrote observations on Sorbiere's voyage to England, and in 1668 edited his friend Cowley's poems. In 1668 he became prebendary of Westminster, afterwards minister of St. Margaret's church, canon of Windsor, and in 1683 dean of Westminster, and next year bishop of Rochester. In 1685 he wrote the history of the Rye-house plot, and as he had been noticed by James II. and made dean of the chapel-royal, he was appointed one of the commissioners for ecclesiastical affairs. In this he acted with timidity, and then withdrew; but when it was debated whether the throne was vacant by the flight of James, he boldly stood the advocate of his master. He, however, submitted to the revolution, and took the oaths; but an attempt was made to involve him in trouble by forging his name, and by introducing into his house the plan of a pretended plot. In all which, however, he proved his innocence. He died 1713. His character is delineated with some asperity by Burnet; but it should be remembered that they were enemies, and that they were of diametrically opposite political sentiments. He wrote besides a relation of the wicked conspiracy of Stephen Blackhead and Robert Young, who united to rob him of his honour and of his life—and also sermons, 8vo.—poems, &c.

To SPRAWL. *v. n.* (*spradle*, Danish.) 1. To struggle, as in the convulsions of death (*Hudibras*). 2. To tumble or creep with much agitation and contortion of the limbs (*Dryden*).

SPRAY. *s* 1. The extremity of a branch (*Dryden*). 2. The foam of the sea, commonly written *spry* (*Arbuthnot*).

To SPREAD. *v. a.* (ꞅpꞃeꞇan, Saxon; *spreyden*, Dutch.) 1. To extend; to expand; to make to cover or fill a larger space than before (*Bacon*). 2. To cover by extension (*Granv.*). 3. To cover over (*Isaiah*). 4. To stretch; to extend (*Milton*). 5. To publish; to divulge; to disseminate (*Matthew*). 6. To emit as effluvia or emanations (*Milton*).

To Spread. *v. n.* To extend or expand itself (*Bacon*).

Spread. *s.* (from the verb.) 1. Extent; compass (*Addison*). 2. Expansion of parts (*Bacon*).

SPRE'ADER. *s.* (from *spread.*) 1. One that spreads (*Hooker*). 2. Publisher; divulger; disseminator (*Swift*).

SPREE, a river of Germany, which rises in the mountains of Bohemia, and passing through Lusatia, into the marquisate of Brandenburg, runs by Berlin, and falls into the Havel, opposite Spandaw.

SPRENGELIA, in botany, a genus of the class pentandria, order monogynia. Calyx five-parted, permanent; stamens inserted into the receptacle; anthers united; capsule five-celled, five-valved; the partitions from the middle of the valves. One species only; a shrub of New Holland, with waved leafy branches; terminal, clustered, pedicelled, pale red flowers; and rose-colour calyx.

SPRENT. *part.* (ꞅpꞃenan, Sax.; *sprengen*, Dutch.) Sprinkled: obsolete (*Sidney*).

SPRIG. *s.* (*ysbrig*, Welsh.) A small branch; a spray (*Bacon*).

Sprig chrystal. *s.* Chrystal found in form of an hexangular column, adhering at one end to the stone, and lessening till it terminates in a point (*Woodward*).

SPRI'GGY. *a.* (from *sprig.*) Full of small branches.

SPRIGHT. *s.* (contraction of *spirit.*) 1. Spirit; shade; soul; incorporeal agent (*Spen.*). 2. Walking spirit; apparition (*Locke*). 3. Power which gives cheerfulness or courage (*Sidney*). 4. An arrow: not in use (*Bacon*).

To Spright. *v. a.* To haunt as a spright. A ludicrous use (*Shakspeare*).

SPRI'GHTFUL. *a.* (*spright* and *full.*) Lively; brisk; gay; vigorous (*Otway*).

SPRI'GHTFULLY. *ad.* (from *sprightful.*) briskly; vigorously (*Shakspeare*).

SPRI'GHTLESS. *a.* (from *spright.*) Dull; enervated; sluggish (*Cowley*).

SPRI'GHTLINESS. *s.* (from *sprightly.*) Liveliness; briskness; vigour; gayety; vivacity (*Addison*).

SPRI'GHTLY. *a.* (from *spright.*) Gay; brisk; lively; vigorous; airy; vivacious (*Prior*).

To SPRING. *v. n.* preterit *sprung* or *sprang*, anciently *sprong*; part. *sprung.* (ꞅpꞃinᵹan, Saxon; *springen*, Dutch.) 1. To arise out of the ground, and grow, by vegetative power (*Pope*). 2. To begin to grow (*Ray*). 3. To proceed as from seed (*Milton*). 4. To come into existence; to issue forth (*Pope*). 5. To arise; to appear (*Judges*). 6. To issue with effect of force (*Pope*). 7. To proceed as from ancestors (*Ben Jonson*). 8. To proceed as from a ground, cause, or reason (*Milton*). 9.

To grow; to thrive (*Dryden*). 10. To bound; to leap; to jump; to rush hastily; to appear suddenly (*Blackmore*). 11. To fly with elastic power (*Mortimer*). 12. To rise from a covert (*Otway*). 13. To issue from a fountain (*Genesis*). 14. To proceed as from a source (*Dryden*). 15. To shoot; to issue with speed and violence (*Pope*).

To SPRING. *v. a.* 1. To start; to rouse game (*Donne*). 2. To produce quickly (*Dryden*). 3. To make by starting a plank (*Dry.*). 4. To discharge a mine (*Addison*). 5. To contrive on a sudden; to produce hastily; to offer unexpectedly (*Swift*). 6. To pass by leaping (*Thomson*).

SPRING. *s.* (from the verb.) 1. The season in which plants spring and vegetate (*Shaksp.*). 2. An elastic body; a body which, when distorted, has the power of restoring itself to its former state (*Moxon*). 3. Elastic force (*Newton*). 4. Any active power; any cause by which motion is produced or propagated (*Rymer*). 5. A leap; a bound; a jump; a violent effort; a sudden struggle (*Addison*). 6. A leak; a start of a plank (*Ben Jonson*). 7. A fountain; an issue of water from the earth (*Davies*). 8. A source; that by which any thing is supplied (*Dryden*). 9. Rise; beginning (*Samuel*). 10. Cause; original (*Swift*).

SPRING, in natural history, a fountain or source of water, rising out of the ground. Various have been the opinions of philosophers concerning the origin of springs; but those which deserve notice are only the three following ones: 1. That the sea-water is conveyed through subterraneous ducts, or canals, to the places where the springs flow out of the earth: but as it is impossible that the water should be thus conveyed to the tops of mountains, since it cannot rise higher than the surface, some have had recourse to subterraneous heats; by which being rarified, it is supposed to ascend in vapours through the bowels of the mountains. But as no sufficient proof is brought of the existence of these central heats, or of caverns in the mountains big enough to let the vapours ascend, supposing such heats, we shall not take up our reader's time with a formal refutation of this hypothesis. 2. As to those who advance the capillary hypothesis, or suppose the water to rise from the depths of the sea through the porous parts of the earth, as it rises in capillary tubes, or through sand or ashes, they seem not to consider one principal property of this kind of tube, or this sort of attraction: for though the water rise to the top of the tube or sand, yet will it rise no higher, because it is by the attraction of the parts above that the fluid rises, and where that is wanting it can rise no further. Therefore, though the waters of the sea may be drawn into the substance of the earth by attraction, yet it can never be raised by this means into a cistern, or cavity, to become the source of springs. 3. The third hypothesis is that of the sagacious naturalist, Dr. Halley, who supposes the true sources of springs to be melted snow, rain water, dew, and vapours condensed.

In order to prove that the vapours raised by the heat of the sun from the surface of the seas, lakes, and rivers are abundantly sufficient to supply the springs and rivers with fresh water, the doctor made the following experiment: he took a vessel of water, made of the same degree of saltness with that of the sea, by means of the hydrometer; and having placed a thermometer in it, he brought it, by means of a pan of coals, to the same degree of heat with that of the air in the hottest summer. He then placed this vessel, with the thermometer in it, in one scale, and nicely counterpoised it with weights in the other: after two hours, he found that about the sixtieth part of an inch was gone off in vapour, and consequently in twelve hours, the length of a natural day, one tenth of an inch would have been evaporated. From this experiment it follows, that every ten square inches of the surface of the water yield a cubic inch of water in vapour per day, every square mile 6,914 tons, and every square degree (or 69 English miles) 33 millions of tons. Now, if we suppose the Mediterranean to be 40 degrees long, and 4 broad at a medium, which is the least that can be supposed, its surface will be 160 square degrees, from whence there will evaporate 5280 millions of tons per day, in the summer time. The Mediterranean receives water from the nine great rivers following, viz. the Iberus, the Rhine, the Tyber, the Po, the Danube, the Neister, the Borysthenes, the Tanais, and the Nile; all the rest being small, and their water inconsiderable. Now let us suppose that each of these rivers conveys ten times as much water to the sea as the Thames; which, as is observed, yields daily 76,032,000 cubic feet, which is equal to 203 millions of tons; and therefore all the nine rivers will produce 1827 millions of tons; which is little more than one-third of the quantity evaporated each day from the sea. The prodigious quantity of water remaining, the doctor allows to rains, which fall again into the seas, and for the uses of vegetation, &c. As to the manner in which these waters are collected, so as to form reservoirs for the different kinds of springs, it seems to be this: the tops of mountains, in general, abound with cavities, and subterraneous caverns formed by nature to serve as reservoirs; and their pointed summits, which seem to pierce the clouds, stop those vapours which fluctuate in the atmosphere, and being constipated thereby, they precipitate in water, and by their gravity easily penetrate through beds of sand and lighter earth, till they are stopped in their descent by more dense strata, as beds of clay, stone, &c. where they form a bason or cavern, and work a passage horizontally, and issue out at the side of the mountain. Many of these springs running down by the vallies, between the ridges of hills, and uniting their streams, form rivulets or brooks; and many of these, again, uniting on the plain, become a river.

Springs are either such as run continually, called perennial; or such as run only for a time, and at certain seasons of the year, and therefore called temporary springs. Others again are called intermitting springs, because they flow and then stop, and flow and stop again: and, finally, reciprocating springs, whose waters rise and fall, or flow and ebb, by regular intervals.

With respect to mineral springs, or those which are impregnated with sulphureous, saline, or metallic substances, see our articles Mineral waters, and Mineralogy. And for Dr. Marcet's very admirable method of analyzing the waters of such springs, see the first vol. of the Transactions of the Geological Society, or Nicholson's Journal, vol. xxxii. the numbers for May and June 1812.

Spring (*ver*,) in cosmography, denotes one of the seasons of the year; commencing, in the northern parts of the world, on the day the sun enters the first degree of Aries, which is about the twenty-first day of March, and ending when the sun leaves Gemini.

Or, more strictly and generally, the spring begins on the day when the distance of the sun's meridian altitude from the zenith, being on the increasing hand, is at a medium between the greatest and least. The end of the spring coincides with the beginning of summer.

Spring (*elater*), in physics, denotes a natural faculty, or endeavour, of certain bodies, to return to their first state, after having been violently put out of the same by compressing, bending them, or the like.

This faculty philosophers usually call elastic force, or elasticity.

Fleas only jump to those excessive heights by means of a springy membrane, easily visible by a microscope; and whereof we have a curious figure in Dr. Hook's Micrography. By the elastic force of this spring they are enabled to leap two hundred times the height of their own body. See Flea, Pulex, and Elater.

Nature has provided for the regular sowing of the seeds of several kinds of plants, by furnishing them with a spring, which is wound sometimes round the outside, and sometimes round the inside, of the case wherein the seeds are contained. See Semination.

Spring, in mechanics, denotes a thin piece of tempered steel, or other elastic substance; which, being wound up, serves to put several machines in motion by its elasticity, or endeavour to unbend itself; such is the spring of a clock, watch, and the like. The spring of a lock, gun, pistol, or the like, is a piece of steel, violently bent; which, being set at liberty, beats back the bolt of the lock, or strikes down the cock.

The spring of a watch is prepared by forming a very thin plate of steel into a double ring, bending it round with wire, and putting it into a proper furnace, in order to give it a suitable degree of heat. When that is acquired it is taken out, and dropped into a kettle of oil, or warm mutton suet, in consequence of which process it possesses a degree of hardness very little inferior to that of glass. After this it is reduced or let down, if the steel be of a proper kind for the purpose, to a fine violet or blue colour; in which state it becomes exceedingly elastic, insomuch that to make it stand bent, it must be brought into a very acute curve; nor can it easily be brought by twisting horizontally, to alter its form, without endangering its being broken to pieces. But as it afterwards requires to be planished by the hammer, filed and polished, it is again deprived in a considerable degree of its elasticity; and, therefore, when it has received its last polish, it must again be blued upon a brass plate over a lamp, by which means its former elasticity is perfectly restored. Dr. Hook, in his Micrography, says, that this blue covering is owing to the fine sulphur, pressed through the pores by heat, and fixed by the ambient air in a fine vitrified lamina upon the surface. See Steel.

Spring (Length of a), may, according to its etymology, signify the length of any elastic body, but it is particularly used by Dr. Jurin to signify the greatest length to which a spring can be forced inwards, or drawn outwards, without prejudice to its elasticity. He observes this would be the whole length, were the spring considered as a mathematical line; but in a material spring, is the difference between the whole length, when the spring is in its natural situation, or the situation it will rest in when not disturbed by any external force, and the length or space it takes up when wholly compressed and closed, or when drawn out.

Spring (*Strength*, or *force of a*), is used for the least force or weight, which, when the spring is wholly compressed or closed, will restrain it from unbending itself. Hence also the force of a spring bent, or partly closed, is used for the least force or weight, which, when the spring is bent through any space less than its whole length, will confine it to the state it is then in, without suffering it to unbend any farther.

The theory of springs is founded on this principle, *ut tensio, sic vis*; that is, if a spring be forced or bent inwards, or drawn outwards, or any way removed from its natural situation, its resistance is proportional to the space by which it is removed from that situation.

This principle was verified by the experiments of Dr. Hook, and since him by those of others, particularly by the accurate hand of Mr. George Graham. Lectures De Potentia Restitutiva, 1678.

Spring (*arbor*), in a watch, is that part in the middle of the spring-box, about which the spring is wound or turned, and to which it is hooked at one end.

Spring-box, in a watch, is the cylindrical case, or frame, containing within it the spring of the watch.

Spring-compasses. See Compasses.

Spring of the air, or its elastic force. See Air, and Elasticity.

Spring-tides, are the higher tides, about the times of the new and full moon. See Tide.

SPRINGES. Certain devices for catching birds, both great and small. Observing well the fowls intended to be taken, and the places where they usually feed mornings and evenings, and the water-tracts where they usually stalk and paddle for worms, flat-grass, roots, and similar substances; next take notice where several furrows or water drains meet in one, and after a small course divide themselves again into other parts, or branches, this middle part being the deepest, and, as it were, feeding the rest; and determine which is most paddled, and fittest for them to wade in: for such are the most likely places for your purpose. Then take small and short sticks, and stick them cross-wise, overthwart all the other passages, one stick within about half an inch of each other, making, as it were, a kind of fence, to guard every way, except one, through which you would have the fowl pass.

This being done, take a good stiff stick, cut flat on each side, and pricking both ends into the water, make the upper part of the flat side of the stick touch the water, and no more; then make a bow of a small hazle or willow, in the form of a pear, broad and round at one end, and narrow at the other, and at least a foot long, and five or six inches wide, and at the narrow end a little nick or dent; after which take a good stiff young plant of hazle, elm, or withy, bushy grown, and without knots, three or four inches round at the bottom, and about an inch at top, and having made the bottom end sharp, fasten at the top a very strong loop, of about a hundred horse hairs, plaited very fast together with strong pack-thread, and made smooth and pliable, to slip and run at pleasure, which loop should be of just the dimensions of the hoop, made pear-wise; then near the loop, with strong horse hair, within an inch and a half of the end of the plant, fasten a little broad, but thin tricker, made sharp and equal at both ends. The larger sharp end of the plant being thrust and fixed into the ground, close by the edge of the water, the smallest end with the loop and the tricker should be brought down to the first bridge; and the hoop made pear-wise being laid upon the bridge, one end of the tricker must be set upon the nick of the hoop, and the other end against the nick made on the small end of the plate, which by the violence and bend of the plant will make them stick and hold together until the hoop be moved: this done, the loop must be laid on the hook according to its size; then from each side of the hoop prick little sticks as aforesaid, as though making an impaled path way to the hoop, and as you go farther and farther from the hoop or spring, so widen the way, that the fowl may be considerably entered before he perceives the fence, the first entrance being about the width of an indifferent furrow, so that any fowl falling, may be enticed to go and wade upon the same, where no sooner shall he touch the spring with his head, feet or feathers, but he shall be caught immediately; and according to the strength of the plant, you may catch any fowl, whether large or diminutive.

For the taking smaller birds with this engine, as the snipe, woodcock, or pewit, accustomed to feed in wet and marshy grounds, and amongst water-furrows or rillings, sucking thence the fatness of the soil, the device is the same, except that it may be made of much less strength and substance, according to the fowl it is set for, especially the sweeper or main plant, which, as before ordered, is to be of elm, hazle, or withy, and so in this case may be of willow, sallow, or strong grown osier, or any other elastic plant that will bend and recover its straightness again: this kind of engine is only for the winter season, when much wet is on the ground; but if there happen to be great frosts, so that you are deprived of the advantage of the waters, then find out where those frozen streams have any descent or small passages, so that by the swiftness of the current the water may not be frozen, and there set your springes, and the greater the frost, the more apt will the birds be to be taken.

SPRI′NGER. *s.* (from *spring.*) One who rouses game.

SPRI′NGHALT. *s.* (*spring* and *halt.*) A lameness by which the horse twitches up his legs (*Shakspeare*).

SPRI′NGINESS. *s.* (from *springy.*) Elasticity; power of restoring itself (*Boyle*).

SPRI′NGLE. *s.* (from *spring.*) A springe; an elastic noose (*Carew*).

SPRINGTAIL, in entomology. See PODUCA.

SPRI′NGY. *a.* (from *springe.*) 1. Elastic; having the power of restoring itself (*Bentley*). 2. (from *spring.*) Full of springs or fountains: not used (*Mortimer*).

To SPRI′NKLE. *v. a.* (*sprinkelen*, Dutch.) 1. To scatter; to disperse in small masses (*Exodus*). 2. To scatter in drops (*Numbers*). 3. To besprinkle; to wash, wet, or dust by scattering in particles (*Dryden*).

To SPRI′NKLE. *v. n.* To perform the act of scattering in small drops (*Ayliffe*).

SPRI′NKLER. *s.* One that sprinkles.

To SPRIT. *v. a.* (ꞅpꞃýꞇꞇan, Saxon; *spruyten*, Dutch.) To throw out; to eject with force. Commonly *spirt* (*Brown*).

To SPRIT. *v. n.* To shoot; to germinate; to sprout.

SPRIT. *s.* (from the verb.) Shoot; sprout (*Mortimer*).

SPRI′TSAIL. *s.* (*sprit* and *sail.*) The sail which belongs to the boltsprit (*Wiseman*).

SPRITE. *s.* (contracted from *spirit.*) A spirit; an incorporeal agent (*Pope*).

SPRI′TEFULLY. *ad.* (See SPRIGHTFULLY.) Vigorously; with life and ardour (*Chapman*).

SPRI′TELY. *ad.* (from *sprite.*) Gayly (*Ch.*).

SPRONG. The old preterit of *spring*.

SPROTTAU, a town of Silesia, in the duchy of Glogau, with walls flanked by towers, and a strong castle. It is seated at the confluence of the Bober and Sprotta, 20 miles S.W. of Glogau. Lon. 15. 38 E. Lat. 51. 40 N.

To SPROUT. *v. n.* (ꞅpꞃýꞇꞇan, Sax. *spruyten*, Dutch.) 1. To shoot by vegetation; to germinate (*Prior*). 2. To shoot into ramifications (*Bacon*). 3. To grow (*Tickel*).

Sprout. *s.* (from the verb.) A shoot of a vegetable (*Bacon*).

SPRUCE. *a.* Nice; trim; neat without elegance (*Tatler*).

To Spruce. *v. n.* (from the adjective.) To dress with affected neatness.

Spruce-beer, a cheap and wholesome liquor, which is thus made: Take of water sixteen gallons, and boil the half of it. Put the water thus boiled, while in full heat, to the reserved cold part, which should be previously put into a barrel or other vessel; then add sixteen pounds of treacle or molasses, with a few tablespoonfuls of the essence of spruce, stirring the whole well together; add half a pint of yeast, and keep it in a temperate situation, with the bunghole open, for two days, till the fermentation be abated. Then close it up or bottle it off, and it will be fit for being drunk in a few days afterwards. In North America, and perhaps in other countries, where the black and white spruce-firs abound, instead of adding the essence of the spruce at the same time with the molasses, they make a decoction of the leaves and small branches of these trees, and find the liquor equally good. It is a powerful antiscorbutic, and may prove very useful in long sea-voyages.

Spruce-fir, in botany. See Pinus.

SPRU'CELY. *ad.* (from *spruce.*) In a nice manner.

SPRU'CENESS. *s.* (from *spruce.*) Neatness without elegance.

SPRUNG. The pret. and part. pass. of *spring.*

SPRUNT. *s.* Any thing that is short and will not easily bend.

SPUD. *s.* A short knife; any short thick thing, in contempt (*Swift*).

SPULLERS OF YARN. *s.* (perhaps properly *spoolers.*) Are such as are employed to see that it be well spun, and fit for the loom.

SPUMARIA, in botany, a genus of the class cryptogamia, order fungi. Follicles branched, filled with seminiferous fibres, covered with a cellular branny bark. One species only, S. mucilago, a fungus of our own country.

SPUME. *s.* (*spuma*, Lat.) Foam; froth (*Milton*).

To Spume. *v. n.* (*spumo*, Latin.) To foam; to froth.

SPU'MOUS. Spu'my. *a.* (*spumeus*, Latin.) Frothy; foamy (*Brown*).

SPUN. The preterit and part. pass. of *spin.*

SPUNGE. *s.* (*spongea*, Lat.) See Sponge, and Spongia.

To Spunge. *v. a.* (rather *to sponge.*) To hang on others for maintenance (*Swift*).

SPU'NGINGHOUSE. *s.* (*spunge* and *house.*) A house to which debtors are taken before commitment to prison (*Swift*).

SPU'NGY. *a.* (from *spunge.*) 1. Full of small holes, and soft like a spunge (*Dryden*). 2. Wet; moist; watery (*Shakspeare*). 3. Having the quality of imbibing (*Shakspeare*).

SPU'NK. *s.* Rotten wood; touchwood. See Boletus.

SPUR. *s.* (ꞅpuꞃa, Saxon; *spore*, Dutch.) 1. A sharp point fixed on the rider's heel, with which he pricks his horse (*Knolles*). 2. Incitement; instigation (*Bacon*). 3. A stimulus; a prick; any thing that galls and teases (*Shakspeare*). 4. The sharp points on the legs of a cock with which he fights (*Ray*). 5. Any thing standing out; a snag (*Shakspeare*).

To Spur. *v. a.* (from the noun). 1. To prick with the spur; to drive with the spur (*Collier*). 2. To instigate; to incite; to urge forward (*Locke*). 3. To drive by force (*Shakspeare*).

To Spur. *v. n.* 1. To travel with great expedition (*Dryden*). 2. To press forward (*Grew*).

SPU'RGALLED. *a.* (*spur* and *gall*). Hurt with a spur (*Shakspeare*).

SPURGE, in botany. See Euphorbia.

Spurge laurel. See Daphne.

SPU'RIOUS. *a.* (*spureus*, Latin.) 1. Not genuine; counterfeit; adulterine (*Swift*). 2. Not legitimate; bastard (*Addison*).

SPU'RLING. *s.* (*esperlan*, French.) A small sea fish (*Tusser*).

To SPURN. *v. a.* (ꞅpoꞃnan, Saxon.) 1. To kick; to strike or drive with the foot (*Shakspeare*). 2. To reject; to scorn; to put away with contempt; to disdain (*Shakspeare*). 3. To treat with contempt (*Locke*).

To Spurn. *v. n.* 1. To make contemptuous opposition; to make insolent resistance (*Shakspeare*). 2. To toss up the heels; to kick or struggle (*Gay*).

Spurn. *s.* (from the verb.) Kick; insolent and contemptuous treatment (*Shaks.*).

Spurn-head, a promontory in Yorkshire, at the N.E. entrance of the mouth of the Humber, on which is a lighthouse. Lon. 0. 15 E. Lat. 53. 38 N.

SPU'RRER. *s.* (from *spur.*) One who uses spurs.

SPU'RRIER. *s.* (from *spur.*) One who makes spurs.

SPURRY, in botany. See Spergula.

SPURSTOW (William, D. D.), master of Catherine hall, Cambridge, was expelled in the civil wars, for refusing the engagement, and was afterwards minister of Hackney, of which he was deprived for nonconformity. He was member of the Westminster assembly of divines, and was at the Savoy conference. He was author of a Treatise on the Promises, 8vo.; the Spiritual Chemist, 8vo.; the Wiles of Satan, and Sermons; and died in 1666.

To SPURT. *v. a.* (See *To* Spirt.) To fly out with a quick stream (*Wiseman*).

SPU'RWAY. *s.* (*spur* and *way.*) A horseway; a bridle-road; distinct from a road for carriages.

SPUTA'TION. *s.* (*sputum*, Latin.) The act of spitting (*Harvey*).

To SPU'TTER. *v. n.* (*sputo*, Latin.) 1. To emit moisture in small flying drops (*Dryden*). 2. To fly out in small particles with some noise (*Dryden*). 3. To speak hastily and obscurely, as with the mouth full; to throw out the spittle by hasty speech (*Congreve*).

To SPU′TTER. *v. a.* To throw out with noise and hesitation (*Swift*).

SPU′TTER. *s.* Moisture thrown out in small drops.

SPU′TTERER. *s.* One that sputters.

SPY. *s.* (*yspia,* Welsh; *espion,* French; *spie,* Dutch.) One sent to watch the conduct or motions of others (*Clarendon*).

To SPY. *v. a.* (from the noun.) 1. To discover by the eye at a distance, or in a state of concealment; to espy (*Donne*). 2. To discover by close examination (*Decay of Piety*). 3. To search or discover by artifice (*Numb.*).

To SPY. *v. n.* To search narrowly (*Shaks.*).

SPY′BOAT. *s.* (*spy* and *boat.*) A boat sent out for intelligence (*Arbuthnot*).

SQUAB. *a.* 1. Unfeathered; newly hatched (*King*). 2. Fat; thick and short; awkwardly bulky (*Betterton*).

SQUAB. *s.* A kind of sofa or couch; a stuffed cushion (*Pope*).

SQUAB. *ad.* With a heavy sudden fall, plump and flat. A low word (*L'Estrange*).

To SQUAB. *v. n.* To fall down plump or flat; to squelsh or squash.

SQUA′BBISH. *a.* (from *squab.*) Thick; heavy; fleshy (*Harvey*).

To SQUA′BBLE. *v. n.* (*kiabla,* Swedish.) To quarrel; to debate peevishly; to wrangle; to fight. A low word (*Collier*).

SQUA′BBLE. *s.* (from the verb.) A low brawl; a petty quarrel (*Arbuthnot*).

SQUA′BBLER. *s.* (from *squabble.*) A quarrelsome fellow; a brawler.

SQUA′BPIE. *s.* (*squab* and *pie.*) A pie made of many ingredients (*King*).

SQUA′DRON. (*escadron,* Fr. *squadrone,* Ital.) 1. A body of men drawn up square (*Milton*). 2. Part of an army; a troop (*Kn.*). 3. Part of a fleet; a certain number of ships (*Arbuthnot*).

SQUA′DRONED. *a.* (from *squadron.*) Formed into squadrons (*Milton*).

SQUADS, in a military sense, are certain divisions of a company into so many parts, generally into three or four. The use of forming companies into as many squads of inspection as it has serjeants and corporals, is proved by those regiments who have practised that method; as by it the irregularity of the soldiers is considerably restrained, their dress improved, and the discipline of the regiment in general most remarkably forwarded. Every officer should have a roll of his company by squads.

SQUA′LID. *a.* (*squalidus,* Latin.) Foul; nasty; filthy (*Dryden*).

To SQUALL. *v. n.* (*squala,* Swedish.) To scream out as a child or woman frighted (*Swift*).

SQUALL. *s.* (from the verb.) 1. Loud scream (*Swift*). 2. Sudden gust of wind. A sailor's word.

SQUA′LLER. *s.* (from *squall.*) Screamer; one that screams.

SQUA′LLY. *a.* (from *squall.*) Windy; gusty.

SQUA′LOR. *s.* (Latin.) Coarseness; nastiness (*Burton*).

SQUALUS. Shark. In zoology, a genus of the class pisces, order chondropterigia. Head obtuse; spiracles from four to seven, semilunar at the sides of the neck; eyes oblong, vertical, half-covered, placed beneath the temporal orifices; mouth beneath, in the fore-part of the head; teeth numerous, serrate, unequal, sharp, partly moveable, partly fixed; body oblong, roundish, rough, with very tender prickles; ventral fins generally less than the pectoral, approximate, and situated round the vent. Thirty-four species; scattered through the seas of the globe: about twelve of them inhabitants of our own coasts. They are thus subdivided:

A. With temporal orifice and anal fin.
B. With anal fin, but no temporal orifice.
C. With temporal orifice, but no anal fin.
D. Toothless. A section contains only two, natives of the Red sea.

This dreadful and rapacious genus inhabit the sea only, and are rarely found in the Baltic; they shine by night, and have a tapering, subcompressed body, which in some species grows to an enormous bulk, weighing from a thousand to four thousand pounds: their flesh is hard, tough, and rank; from the liver is extracted a large quantity of oil; the skin is used for carriage-traces, and for polishing wood, ivory, &c.; a few of them are gregarious, and feed on molluscæ, and other marine worms, but most are solitary, wandering, devouring whatever comes in their way, and following ships to seize any thing that may happen to be thrown overboard. They bring forth the young alive, more than one at a time, each of them inclosed in a square, pellucid, horny case, terminated at the four corners by very long slender filaments, which are generally twisted round coral-lines, sea-weeds, or other fixed marine substances.

The following species are chiefly worth noticing.

1. S. canicula. Spotted dog-fish. Nostrils surrounded with a lobe, and vermiform appendage; ventral fins distinct. Head small; snout short; eyes oblong, pupil sea-green, iris white; mouth wide, oblong, with three rows of teeth; tongue cartilaginous, and with the palate rough; vent before the middle of the body; first dorsal fin behind the ventral, second less, and nearly opposite the anal; tail narrow, ending in a sharp angle. Inhabits most seas; and found on our own coasts; four feet long; is very voracious, and feeds chiefly on fishes. Body reddish brown, with large distinct black spots, beneath white, a little compressed at each end. The skin when dried is highly useful for various purposes. The tendrils issuing from the ovary are known to anglers by the name of Indian grass.

2. S. stellaris. Rock shark. Lobes of the nostrils double. Inhabits the European ocean; from two to six feet long; feeds on crustaceous animals, molluscæ, and the smaller fishes. Body reddish, with unequal blackish spots, beneath dirty-ash: resembles S. canicula; but the spots are larger and fewer, the snout a little

longer, the tail rather shorter; the nostrils nearly closed: brings from nineteen to twenty young at a time.

3. S. galeus. Tope. Teeth nearly triangular, serrate on the middle edge. Inhabits the European ocean, and found on our own coasts; above three feet long; body dark cinereous, beneath paler, elongated, round; is exceedingly voracious, and will follow its prey to the very edge of the shore.

4. S. mustelus. Smooth hound. Teeth very small, obtuse. Inhabits European and Pacific seas; and, like the last, frequents our own coasts: two feet long.

5. S. zygæna. Hammer-headed shark. Head very broad, hammer-shaped. Inhabits the Mediterranean, American, and Indian seas; grows to six feet long, and to the weight of five hundred pounds: one of the most rapacious of all its tribe: brings from ten to twelve young at a birth. Its shape peculiarly hideous: head lengthened out on each side like a hammer, convex above and below; eyes placed at the extremities of the widened head, prominent, and directed downwards; near the edge of the head beneath are placed the oblong nostrils, covered with a membrane; mouth arched, near the commencement of the trunk; teeth broad, pointed, serrate, each side in three or four rows in both jaws.

6. S. vulpes. Sea-fox. Long-tailed shark. Upper lobe of the tail as long as the body. Inhabits the Mediterranean sea, and often wanders on the British coast: seven feet long: body above blueish ash, beneath paler; scales very minute; is exceedingly voracious.

7. S. maximus. Basking shark. Teeth conic, not serrate. This is the largest animal of this genus, and differs in some remarkable characters from the rest of the tribe; it inhabits chiefly the cold climates, and has long been known to the inhabitants of the west of Scotland and Ireland, where it is distinguished among the sailors by the name of the basking shark, though better known in the former country by the name of the sail-fish.

The latter of these names has been given it because it is seen at a distance on the top of the water, with all its dorsal fins appearing above the surface, and spread like sails. Both in its manners and external form there are peculiarities in which it differs from the other sharks. It is far from being either voracious or fierce: its food consists chiefly of sea plants, no fish having been ever found in its bowels; nor any thing but the green and half digested remains of algæ: as its habits resemble those of the whale, Linnéus supposes that it is supported by the same food, asserting that it devours only medusæ.

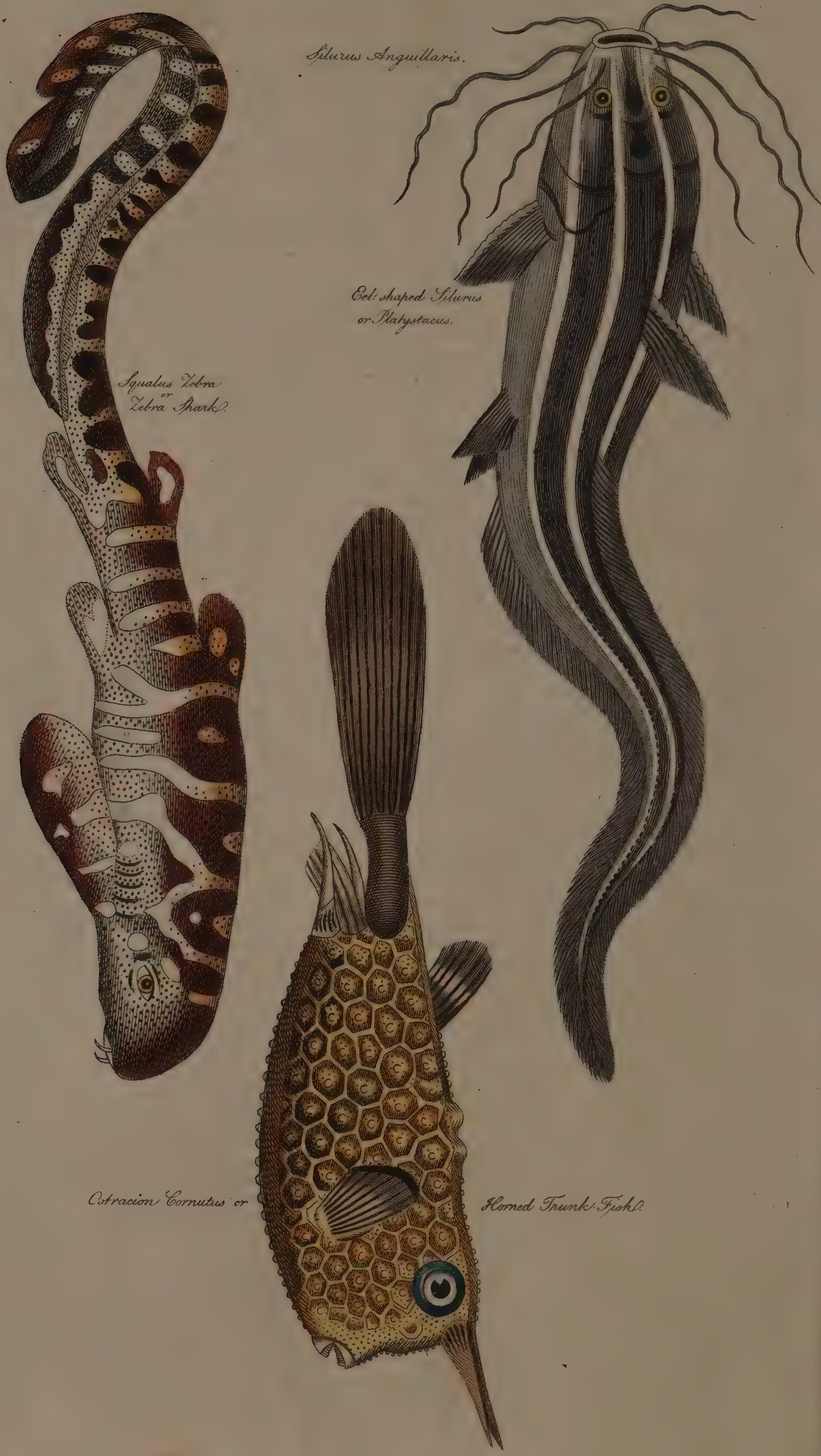
Mr. Pennant has given a very accurate description of this species, and seems first to have discovered its affinity to the sharks, by pointing out the five transverse apertures of the gills on each side of the neck. The oil arising from their capture is now made an article of trade in the west of Scotland, where we have seen from six to eight barrels taken from one fish, though it is only the liver that produces it. They lie quiet and motionless on the surface, commonly on their bellies, but sometimes, like tired swimmers, upon their back; and it is in this posture that they allow a boat to approach them, sometimes till it is within contact, without attempting to escape. Then the harpooner strikes his weapon into the body, as near as possible to the gills: but so insensible are they to the wound, that they do not feel its pain, till, by the united strength of two men, the instrument is forced very deep into their flesh. As soon as they feel themselves wounded, they fling up their tail, and dive to the bottom. Frequently in their agonies, they coil the rope about them, attempting to disengage the harpoon by rolling upon the ground. Having at length discovered, however, that all efforts of this kind are vain, they swim away with amazing rapidity, and with such violence, that a vessel of seventy tons has been towed after them against a fresh gale. They sometimes run off with two hundred fathoms of line, and with two harpoons in them; and will employ the fishes for twelve, and sometimes twenty-four hours before they are subdued. When killed, they are either hawled on shore, or, if at a distance from land, to the vessel side; where the liver is taken out and melted into oil, in kettles provided for that purpose.

The basking shark is from fifteen to thirty feet in length; above of a leaden colour, below a pure white; form of the body, slender and tapering. The upper jaw projects beyond the lower, and is rounded at the end; the mouth is placed beneath, and furnished with a vast number of small teeth. The dorsal fins are placed differently from those of the rest of the genus: the first rises nearer the head than the tail; the second is much smaller, and is situated nearer the extremity. On the under part of the body there are five fins; two pectoral, two ventral, placed below the second fin of the back, and a small anal fin. Near these the male animal is provided with a double organ of generation; and between them in the female is situated the pudendum. The oil produced by these animals is said to be preferable to every other for the manufacture of wool; and the skin furnishes workmen with an excellent shagreen.

8. S. carcharias. White shark. Teeth triangular, serrate. This shark is the most ravenous and formidable of the whole tribe, and grows to the immense weight of four thousand pounds. It was in the body of one of this species that a corpse was found whole; a circumstance no way incredible, when we consider their strong appetite for human flesh, and the amazing power of deglutition which an animal of this size must possess. In all hot climates, it is this species in particular that is the terror of the sailors; it is these that constantly attend the ships, watching till some one drop overboard, or attempt to bathe; in either case, the unfortunate seaman perishes irrecoverably; for this voracious creature will even dart up above the water to meet him in his fall. It

NATURAL HISTORY.

PL. CLXXIX.



Silurus Anguillaris.

Eel-shaped Silurus
or Platystacus.

Squalus Zebra
or
Zebra Shark.

Ostracion Cornutus or Horned Trunk-Fish.

London, Published by Sherwood & Co. Paternoster Row, August 1st 1812.

is in this fish Rondeletius places the prophet Jonas, observing, that the language of Scripture gives no repugnance to his idea; for that among the ancients all large fishes whatever were termed whales.

The mouth of this species is proportioned to his immense bulk: it is furnished with six rows of teeth, the number of which probably varies, according to the age of the fish. Fossil teeth of the white shark are frequently dug up in Malta, and sometimes in England: in the former country, they have been seen four inches long, which must have belonged to animals of vast size, if the proportions laid down by Grew, between the body and the teeth of this species, be correct; who asserts, that those in the jaw of a shark of two yards long are not above half an inch; whence the fossil teeth found in Malta would, according to this calculation, belong to an animal sixteen yards in length.

Pliny, Oppian, and several of the ancient naturalists, were acquainted with this species, whose mouth they justly describe as situated far beneath the head, obliging the animal to turn almost upon its back, when it devours its prey. The eyes are small, round, and covered with a nictitant cartilage. The dorsal and pectoral fins are very large, and aid the efforts of the tail, in giving rapidity to the fish's motion. The tail itself is semilunar, and capable of producing the most dreadful strokes; hence, the sailors, as soon as they take one of these fishes, instantly disarm it, by cutting off the tail.

9. S. glaucus. Blue shark. Sides of the tail smooth; lower part of the back with a triangular dent. This species has obtained its name from the fine azure colour of the back; it is most frequently an inhabitant of the hot climates, where it is scarcely less formidable to seamen than that immediately preceding. The body is less rough than those of the rest of the genus. The eyes are of an elliptical shape, but the irids perfectly round and of a yellowish white: behind them, there are none of those foramina, which are observed in other species. The fish is of an oblong shape; the nose long, sharp, and compressed towards the point; the nostrils placed transversely. Although most frequent in the warm climates, the blue shark is often seen on the British coasts, and particularly those of Cornwall, during the pilchard season. It is there caught by the fishers, with large iron hooks made for the purpose.

Rondelet ascribes to this species only two rows of teeth; but their number probably depends upon the animal's age; and if so, no conclusion can be drawn with regard to it, from a single instance: they are granulated, and of a triangular shape. This naturalist declares, that he was an eye witness of the blue shark's fondness for human flesh; having seen one pursue a boy a considerable way along the shore, and make a spring at him, that nearly bit off his legs.

It is concerning this species that Ælian relates such extraordinary instances of parental affection. It is said by him, that the blue shark permits its small brood, when in danger, to swim down its mouth, and take shelter in its belly. This fact is said also to have been observed by Rondelet, and it is narrated by Pennant, as a part of history entitled to belief. In fact it is no more incredible, than that the young of the opossum should seek an asylum in the ventral pouch of its parent; a fact too well known to be contested: or that the crotalus and viper should swallow their young on the same occasion for the same purpose.

10. S. squalina. Angel fish. Pectoral fins very large, notched on the fore-part. This fish also possesses the character of extreme voracity. In its external figure it approaches the nature and form of the ray, while it differs from both it and other sharks in the situation of the mouth; that organ being placed in the extremity of the snout, and not below the head. The angel grows frequently to the weight of an hundred and sixty pounds: its body is covered over with a filthy mucus, beneath which lies a rough skin, employed formerly by the workmen as a shagreen. It was from this circumstance that the fish obtained the name of file (ρινη) among the Greeks; while the Romans called it squalina, from the filth with which the body is covered. The colour of the back and sides is brownish, that of the belly white. The pectoral fins are large, and seem, like those of the rays, to be a prolongation of the body: it was from these wing-like fins that this fish received its English specific name. The ventral fins are placed in the same manner as the pectoral, and to them is annexed on each side the double penis, that characterises this and the ray. Upon the back, and farther down than the anus, there are two dorsal fins: the tail is bifurcated, the upper lobe rather larger than the under; a character belonging to all the sharks.

This species is described by Rondeletius as an inhabitant of the Mediterranean, but is chiefly found in the Northern seas: it is also seen frequently on the British coasts, where it preys voraciously upon the flat fish that frequents the bottom of the water. The flesh is in no request, but seems loathed in every country, on account of its rank flavour and hardness. The Turks upon the Barbary coast apply the skin to the manufacture of sheaths for swords, which they are said to fabricate with peculiar neatness. None of the uses, however, in which the parts of this malignant monster are employed, seem capable of compensating the dangers to which seamen are continually exposed, from its voracious propensities. From six to eight feet long; brings as many as thirteen at a time. See Nat. Hist. Pl. CLXXIX.

SQUAMA, in anatomy, a scale or lamina of the skin or other organ.

SQUAMARIA, in botany. See LATHRÆA.

SQUAMOSE SUTURE. (*sutura squamosa*, from *squama*, a scale; because the bones lie over each other like scales.) The suture which unites the squamose portion of the temporal bone with the parietal.

SQUA'MOUS. *a.* (*squamosus*, Lat.) Scaly; covered with scales (*Woodward*).

To SQUA'NDER. *v. a.* (*verschwenden*, Teut.) 1. To scatter lavishly; to spend profusely; to throw away in idle prodigality (*Pope*). 2. To scatter; to dissipate; to disperse (*Dryden*).

SQUA'NDERER. *s.* (from *squander*.) A spendthrift; a prodigal; a waster (*Locke*).

SQUARE. *a.* (*ysgwar*, Welch; *quadratus*, Latin.) 1. Cornered; having right angles (*Prior*). 2. Forming a right angle (*Moxon*). 3. Cornered; having angles of whatever content: as, five *square* (*Wiseman*). 4. Parallel; exactly suitable (*Shaks.*). 5. Strong; stout; well set: as, a *square* man. 6. Equal; exact; honest; fair (*Shakspeare*).

SQUARE. *s.* (*quadra*, Latin.) 1. A quadrilateral figure with right angles and equal sides (*Milton*). 2. An area of four sides, with houses on each side (*Addison*). 3. Content of an angle (*Brown*). 4. A rule or instrument by which workmen measure or form their angles. 5. Rule; regularity; exact proportion; justness of workmanship or conduct (*Spenser*). 6. Squadron; troops formed square (*Shakspeare*). 7. A *square* number is when another, called its root, can be exactly found, which multiplied by itself produces the square. 8. Quaternion; number four (*Shakspeare*). 9. Level; equality (*Dryden*). 10. Quartile; the situation of planets, distant ninety degrees from each other (*Milton*). 11. Rule; conformity (*L'Estrange*). 12. SQUARES *go*. The game proceeds (*L'Estrange*).

To SQUARE. *v. a.* (*quadro*, Latin.) 1. To form with right angles (*Boyle*). 2. To reduce to a square (*Prior*). 3. To measure; to reduce to a measure (*Shakspeare*). 4. To adjust; to regulate; to mould; to shape (*Swift*). 5. To accommodate; to fit (*Milton*). 6. To respect in quartile (*Creech*).

To SQUARE. *v. n.* 1. To suit with; to fit with (*Woodward*). 2. To quarrel; to go to opposite sides (*Shakspeare*).

SQUARE, in geometry, a quadrilateral figure, whose angles are right, and sides equal. Or it is an equilateral rectangle. Or an equilateral rectangular parallelogram.

A square, and indeed any other parallelogram, is bisected by its diagonal. And the side of a square is incommensurable to its diagonal, being in the ratio of 1 to $\sqrt{2}$.

To find the area of a square. Multiply the side by itself, and the product is the area. So, if the side be 10, the area is 100; and if the side be 12, the area is 144.

SQUARE FOOT, is a square each side of which is equal to a foot, or 12 inches; and the area, or square foot is equal to 144 square inches.

SQUARE (Geometrical), a compartment often added on the face of a quadrant, called also line of shadows, and quadrant.

SQUARE (Gunner's). See QUADRANT.

SQUARE (Magic). See MAGIC SQUARE.

SQUARE MEASURES, the squares of the lineal measures; as in the following table of square measures;

Square Inches.	Square Feet.	Sq. Yards.	Sq. Poles.	S. Chs.	Acres.	S. Miles.
144	1					
1296	9	1				
39204	272¼	30¼	1			
627264	4356	484	16	1		
6272640	43560	4840	160	10	1	
4014489600	27878400	3097600	102400	6400	640	1

SQUARE (Normal), is an instrument, made of wood or metal, serving to describe and measure right angles. It consists of two rulers or branches fastened together perpendicularly. When the two legs are moveable on a joint, it is called a bevel.

To examine whether the square is exact or not. Describe a semicircle with any radius at pleasure; in the circumference of which apply the angle of the square to any point, and the edge of one leg to one end of the diameter, then if the other leg pass just by the other extremity of the diameter, the square is true; otherwise not.

SQUARE NUMBER, is the product arising from a number multiplied by itself. Thus, 4 is the square of 2, and 16 the square of 4.

The series of square integers, is - 1, 4, 9, 16, 25, 36, &c.
which are the squares of 1, 2, 3, 4, 5, 6, &c.
Or the square fractions $\frac{1}{4}$, $\frac{4}{9}$, $\frac{9}{16}$, $\frac{16}{25}$, $\frac{25}{36}$, $\frac{36}{49}$, &c.
which are the squares of $\frac{1}{2}$, $\frac{2}{3}$, $\frac{3}{4}$, $\frac{4}{5}$, $\frac{5}{6}$, $\frac{6}{7}$, &c.

A square number is so called, because it denotes the area of a square, whose side is expressed by the root of the square number.

For the principal properties of square numbers, see Hutton's edition of Montucla's Recreations, vol. 2, and Barlow on the Theory of Numbers.

SQUARE ROOT. See ROOT.

SQUARE RIGGED, an epithet applied to a ship whose yards are very long. It is also used in contradistinction to all vessels whose sails are extended by stays or lateen-yards, or by booms and gaffs; the usual situation of which is nearly in the plane of the keel; and hence,

SQUARE SAIL, is a sail extended to a yard which hangs parallel to the horizon, as distinguished from the other sails which are extended by booms and stays placed obliquely. This sail is only used in fair winds, or to scud under in a tempest. In the former case, it is furnished with a large additional part, called the bonnet, which is then attached to its bottom, and removed whenever it is necessary to scud. See Scudding.

SQUA'RENESS. *s.* (from *square.*) The state of being square (*Moxon*).

SQUARING THE CIRCLE, is the making or finding a square whose area shall be equal to that of any proposed circle. See Quadrature.

If the diameter of a circle be denoted by D, and S be the side of an equal square; then is

$$S = {\cdot}88622692\,D = \frac{39}{44}D, \text{ nearly:}$$

$$\text{and } D = \frac{S}{{\cdot}88622692} = \frac{44}{39}S \text{ nearly:}$$

SQUARROUS, in botany. (A squamarum piscium similitudine, quorum cutis exurgat ob assiduam inluviem.

> Varronum ac rupicum squarrosa incondita rostra. Lucilius.

Or, according to others, from *squarra*, anciently written *scara*, which is from the Greek ἐσχαρα, scurf.) Ragged; scurfy. Squarrous calyx. Ex squamis undique divaricatis patentissimis. Consisting of scales very widely divaricating, or spreading every way: as in carduus, onopordum, conyza, achyranthes muricata. Squarroum leaf. In lacinias elevatas nec plano parallelas divisum. Divided into shreds or jags, raised above the plane of the leaf, and not parallel to it.

SQUASH. *s.* (from *quash.*) 1. Any thing soft and easily crushed (*Shakspeare*). 2. (*melopepo.*) A plant (*Boyle*). 3. Any thing unripe; any thing soft (*Shakspeare*). 4. A sudden fall (*Arbuthnot*). 5. A shock of soft bodies (*Swift*).

To Squash. *v. a.* To crush into pulp.

Squash gourd, in botany. See Cucurbita.

To SQUAT. *v. a.* (*quattare*, Italian.) To sit cowering; to sit close to the ground.

Squat. *a.* (from the verb.) 1. Cowering; close to the ground (*Swift*). 2. Short and thick; having one part close to another, as those of an animal contracted and cowering (*Grew*).

Squat. *s.* 1. The posture of cowering or lying close (*Dryden*). 2. A sudden fall (*Herbert*).

SQUATINA. See Squalus.

To SQUEAK. *v. n.* (*sqwaka*, Swedish.) 1. To set up a sudden dolorous cry. 2. To cry with a shrill acute tone (*Shakspeare*). 3. To break silence or secrecy for fear or pain (*Dryden*).

Squeak. *s.* (from the verb.) A shrill quick cry; a cry of pain (*Dryden*).

To SQUEAL. *v. n.* (*sqwala*, Swedish.) To cry with a shrill sharp voice; to cry with pain.

SQUEA'MISH. *a.* (for *qualmish*, from *qualm.*) Nice; fastidious; easily disgusted; having the stomach easily turned (*Sidney*).

SQUEA'MISHNESS. *s.* (from *squeamish.*) Niceness; delicacy; fastidiousness (*South*).

To SQUEEZE. *v. a.* (cƿıꞅan, Saxon.) 1. To press; to crush between two bodies (*Dryden*). 2. To oppress; to crush; to harass by extortion (*L'Estrange*). 3. To force between close bodies.

To Squeeze. *v. n.* 1. To act or pass, in consequence of compression (*Newton*). 2. To force way through close bodies (*L'Estrange*).

Squeeze. *s.* (from the verb.) Compression; pressure (*Philips*).

SQUELCH. *s.* Heavy fall (*L'Estrange*).

SQUIB. *s.* (*schieben*, German.) 1. A small pipe of paper filled with wildfire (*Bacon*). 2. Any petty fellow (*Tatler*).

SQUID. The dried bones of the cuttle or other fishes; fossile shells and other marine bodies in a state of comminution.

SQUILACE, a town of Naples, in Calabria Ulteriore, with a bishop's see. It was formerly famous, but is now a small place, seated on the Favelone, near a gulf of the same name, 30 miles S.W. of St. Severino. Lon. 16. 40 E. Lat. 39. 3 N.

SQUILL. (from σκιλλω, to dry.) See Scilla.

Squill (Lesser). See Pancratium.

SQUILLA, a species of cancer. See Cancer.

SQUINANCY. See Quincey.

SQUINANTHUS. (from *squinanthia*, the quincey; so named from its uses in the quincey.) The sweet rush was once so called. See Juncus odoratus.

SQUINT. *a.* (*squinte*, Dutch, oblique.) Looking obliquely; looking not directly; looking suspiciously (*Milton*).

To Squint. *v. n.* To look obliquely; to look not in a direct line of vision (*Bacon*).

To Squint. *v. a.* 1. To form the eye to oblique vision (*Shakspeare*). 2. To turn the eye obliquely (*Bacon*).

SQUI'NTEYED. *a.* (*squint* and *eye.*) 1. Having the sight directed oblique (*Knolles*). 2. Indirect; oblique; malignant (*Denham*).

SQUINTIFE'GO. *a.* Squinting (*Dryden*).

SQUINTING, or Strabismus, an affection of the eyes, occasioned by the optic axis not converging; in consequence of which, the organs of sight appear distorted.

Improper habits frequently induce this defect, while the eye and its muscles are perfect; for instance, in children, who accustom themselves to view different things at one time; or, who are placed obliquely towards any object that may attract their attention. Another cause is mal-conformation of the retina, or such parts as serve to convey impressions to the point of vision; so that persons, thus situated, are obliged to turn the eye from the object to be investigated, in order that they may be enabled to behold it more distinctly.—Farther, it often proceeds from weakness, or defect of either eye, so that both cannot be mutually employed. Besides, it may be consequent on affections of the brain, epilepsy, terror, and defluxions of rheumatic humours.

The method of cure to be adopted in this unpleasant distortion varies according to the cause. Thus, in children, and in cases of weakness of the eyes, it may be remedied by mechanical contrivances. Hence, when there is no organic defect in either eye, which is frequently the case with persons who squint from a depraved habit of moving their eyes, the disease may often be cured. Dr. Darwin remarks (Philosophical Transactions, vol. 68), that in all the squinting people he had occasion to attend, one eye was less perfect than the other: these patients are, in his opinion, certainly curable, by covering the best eye many hours in the day; as, by a more frequent use of the weak eye, it not only acquires a habit of turning to the objects which the patient wishes to see, but gains at the same time a more distinct vision: in both these respects, the better eye is under some disadvantage, which also facilitates the cure. This ingenious physician relates, in the same paper, a remarkable case of a boy, then five years old (now or lately a reputable English clergyman at Edinburgh), who had the misfortune of viewing every object with one eye only at a time. Dr. D. directed a paper gnomon to be made, and affixed to a cap; and, when this artificial nose was placed over the patient's real nose, so as to project an inch between his eyes, the child, rather than turn his head so far to look at oblique objects, immediately began to exert the eye which was nearest to them. But, having the misfortune to lose his father, soon after this method was begun to be followed, the child was neglected for six years, during which time the habit was confirmed in such a manner as seemed to leave little room to hope for a cure. Dr. D. however, being again called, attempted a second time to remove the deformity, by a similar contrivance. A gnomon of thin brass was made, to stand over his nose, with a half-circle of the same metal to go round his temples: these were covered with black silk; and, by means of a buckle behind his head, and a cross-piece over the crown of his head, this gnomon was worn without any inconvenience, and projected before his nose about two inches and a half. By the use of this machine, he soon found it less inconvenient to view all oblique objects, with the eye next to them, instead of the eye opposite to them.

After this habit was weakened, by a week's use of the gnomon, two bits of wood, about the size of a goose-quill, were blackened all but a quarter of an inch at their summits; these were frequently presented to him to look at; one being held on one side the extremity of his black gnomon, and the other on the opposite. In viewing these, they were gradually brought forward beyond the gnomon, and then one was concealed behind the other: by such means, in another week, he could bend both his eyes on the same object for half a minute together; and, by continuing the use of the same machine, he was in a fair way of being cured.

Lastly, if squinting arise from any adventitious circumstance, such as terror, defluxions of humours, &c. the removal of those causes will also cure the disorder; but, where it originates from mal-conformation of the organs of vision, or has been so long neglected as to become confirmed, it is not in the power of art to afford any relief.

To SQUI'NY. *v. n.* To look asquint (*Shakspeare*).

SQUIRE. *s.* (contraction of *esquire.*) 1. A gentleman next in rank to a knight (*Shakspeare*). 2. An attendant on a noble warrior (*Dryden*). 3. An attendant at court (*Shaks.*).

SQUI'RREL. See SCIURUS.

SQUIRREL FISH. See PERCA.

To SQUIRT. *v. a.* (of uncertain etymology.) To throw out in a quick stream (*Arbuthnot*).

To SQUIRT. *v. n.* To let fly; to prate (*L'Estrange*).

SQUIRT. *s.* (from the verb.) 1. An instrument by which a quick stream is ejected (*Pope*). 2. A small quick stream (*Bacon*).

SQUI'RTER. *s.* (from *squirt.*) One that plies a squirt (*Arbuthnot*).

STAAVIA, in botany, a genus of the class pentandria, order monogynia. Flowers aggregate; stamens inserted into the calyx; styles two, united; berry five-seeded, covered with a bark; receptacle chaffy-villous. Two species; natives of the Cape.

To STAB. *v. a.* (*staven*, old Dutch.) 1. To pierce with a pointed weapon (*Shakspeare*). 2. To wound mortally or mischievously (*Phi.*).

To STAB. *v. n.* 1. To give a wound with a pointed weapon (*Dryden*). 2. To offer a stab (*Shakspeare*). 3. To give a mortal wound (*Shakspeare*).

STAB. *s.* (from the verb.) 1. A wound with a sharp-pointed weapon. 2. A dark injury; a sly mischief. 3. A stroke; a blow (*South*).

STA'BBER. *s.* (from *stab.*) One who stabs; a privy murderer.

STABI'LIMENT. *s.* (from *stabilis*, Latin.) Support; firmness; act of making firm (*Derham*).

STABI'LITY. *s.* (*stabilité*, French.) 1. Stableness; steadiness; strength to stand (*Black.*). 2. Fixedness; not fluidity (*Boyle*). 3. Firmness of resolution.

STA'BLE. *a.* (*stabilis*, Latin.) 1. Fixed; able to stand. 2. Steady; constant (*Davies*). 3. Strong; durable (*Rogers*).

To STA'BLE. *v. n.* (*stabulo*, Lat.) To kennel; to dwell as beasts (*Milton*).

To STA'BLE. *v. a.* To put into a stable.

STABLE. A covered dwelling appropriated to beasts; in this country to the horse chiefly. Nothing conduces more to the health of a horse than the having a good and wholesome stable. The situation of a stable should always be in a pure air, and on a firm, dry, and hard ground, that in winter the horse may come in and go out clean. It should always be built somewhat on an ascent, that the urine, and other foulnesses, may be easily conveyed away by means of drains or sinks cut for that purpose.

As there is no animal that delights more in cleanliness than the horse, or that more abominates bad smells, care should be taken that there be no hog-stye, hen-roost, or privy, near the place where the stable is to be built; for the swallowing of feathers, which is very apt to happen when hen-roosts are near, often proves fatal to horses; and the steams of a bog-house, or hogs' dung, will cause many distempers. It is much better to build the walls of a stable with brick than of stone, for the former is always dry, the other often sweats, and is very apt to be moist, and to cause catarrhs to horses that are put into the stable in damp weather.

The walls ought therefore to be of brick, and to be made of a moderate thickness, two bricks, or a brick and a half at the least, both for the sake of safety and warmth in winter, and to keep off the heat of the sun in the midst of summer, which would spoil the horse's appetite, and sink his spirits. The windows should be made on the east and north sides of the building, that the north air may be let in to cool the stables in summer, and the rising sun all the year round, especially in winter. The windows should either be sashed, or have large casements, for the sake of letting in air enough; and there should always be close wooden shutters, that the light may be shut out at pleasure; by which means the horse will be brought to sleep in the middle of the day, as well as in the night, when it is judged proper he should do so. Many pave the whole stable with stone, but it is much better to have that part which the horse is to lie upon boarded with oak planks; for it will be not only easier, but more warm and comfortable to the creature. The boards must be laid as even as possible; for this is the way to make the animal lie most at his ease, and in the most healthful posture. The dealers in horses generally indeed make the boards be laid higher towards the top, and slanting down: this shews a horse to more advantage as he lies; but it is very uncomfortable in one respect, for his hinder parts are always slipping down, and the hind-legs are often made subject to swellings by it. The planks should be laid crosswise, not lengthwise, and there are to be several holes bored through them to receive the urine, and carry it off underneath the floor into some drain, or common receptacle. The ground behind should be raised to a level with the planks, that the horse may always stand even; and the floor behind should be paved with small pebbles, and the place where the rack stands should be well wainscotted. There are to be two rings placed on each side of the stall, for the horse's halter to run through; and a logger is to be fixed to the end of this, sufficient to poise it perpendicularly, but not so heavy as to tire the horse, or to hinder him from eating. The best place for him to eat his corn in is a drawer, or locker, made in the wainscot partition: this need not be large, and consequently need not take up much room; so that it may be easily fixed, and taken out to clean at pleasure: by this means the common dirtiness of a fixed manger may be avoided.

Many people are against having a rack in their stables; they give the horse his hay sprinkled upon his litter; and, if they think he treads it too much, or too soon, they only nail up three or four boards, by way of a trough, to give it to him in. The reason of this is, that the continual lifting up of the head to feed out of the rack is an unnatural posture for a horse, which was intended to take his food from the ground, and makes him, as they express it, withy-cragged. In the way of sprinkling the hay on the litter, or laying it in a trough even with the ground, he not only takes it up as from the earth in a natural way, but can eat it as he lies, which is a piece of indulgence that a horse takes great pleasure in.

When there is stable-room enough, partitions are to be made for several horses to stand in; these should always allow room enough for the horse to turn about, and lie down conveniently in; and they should be boarded up so high toward the head, that the horses, placed in separate stalls, may not be able to smell at one another, nor molest each other any way. One of these stalls ought to be covered in, and made convenient for the groom to lie in, in case of a great match, or the sickness of a valuable horse. Behind the horses there should be a row of pegs, to hang up saddles, bridles, and other necessary utensils; and some shelves for the hanging up brushes, &c. and the standing of pots of ointment and other preparations.

The stables of the nobility are often incommoded by bins for oats placed in them, which take up a great deal of room, with very little advantage. Dr. Plot has given us, in his History of Oxfordshire, a very convenient method used by a gentleman of that country, to supersede this. It is done by making a conveniency to let the oats down from above, out of a vessel, like the hopper of a mill, whence they fall into a square pipe of about four inches diameter, let into the wall, which comes down into a cupboard also let into the wall, but with its mouth so near the bottom, that there shall never be more than about a gallon in the cupboard at a time; which being taken out and given to the horses, another gallon immediately succeeds it from above, without any trouble to the groom, or any body else. By this means there is not an inch of room lost in the lower part of the stable where the horses stand; and there is this great convenience beside, that the oats are always kept sweet by it: for every gallon that is taken away puts the whole quantity above in motion, by the running down of the gallon that supplies its place; and no mustiness ever comes where there is this continual airing and motion. There may easily be contrived two of these; the one for the oats, the other for split beans; and both of them may be let into the range of presses, the oats and beans being separated by partitions. The other requisites for a stable are a dung-yard, a pump, and a conduit; and if some pond or running river be near, it is greatly the better.

STA'BLEBOY. STA'BLEMAN. *s.* (*stable* and *boy*, or *man*.) One who attends in the stable (*Swift*).

STA′BLENESS. *s.* (from *stable.*) 1. Power to stand. 2. Steadiness; constancy; stability (*Shakspeare*).

STA′BLESTAND. *s.* (In law.) Is one of the four evidences or presumptions, whereby a man is convinced to intend the stealing of the king's deer in the forest: and this is when a man is found at his standing in the forest, with a cross bow bent, ready to shoot at any deer; or with a long bow; or else standing close by a tree with greyhounds in a leash.

To STA′BLISH. *v. a.* (*establir*, French.) To establish; to fix; to settle (*Donne*).

STABLO, or Stavelo, a town of Germany, in the bishopric of Liege, with a celebrated abbey, whose abbot is a prince of the empire. Here is a manufacture of leather, which is sent to foreign parts. It is seated on the Recht, nine miles S. of Limburg. Lon. 6. 5 E. Lat. 50. 29 N.

STACCATO. (Ital.) In music, a word signifying that the notes of the passage over which it is written are to be performed in a short, pointed, and distinct manner. The opposite of legato.

STACHYS. Woundwort. In botany, a genus of the class didynamia, order gymnospermia. Calyx five-cleft, awned; upper-lip of the corol vaulted, lower lip reflected at the sides, the middle segment larger and notched; stamens reflected towards the sides after shedding their pollen. Twenty-six species, scattered over the globe; four of them common to our own country, as follows.

1. S. sylvatica. Hedge-nettle. Erect, a yard high, branching; hairy all over; possessing a fetid smell.

2. S. palustris. Clown's all-heal. Two or three feet high; flowers red or purple: smell fetid; taste bitter; formerly accounted a good vulnerary.

3. S. Germanica. Base horehound. Stem downy, two feet high; leaves white, downy, wrinkled, indented; flowers in multiflorous whorls, white, within purplish.

4. S. arvensis. Corn stachys. Petty ironwort, or all-heal. Stem ten or twelve inches high, square, branched, hairy. Found in our corn-fields, from June to August.

STACK. *s.* (*stacca*, Ital.) 1. A large quantity of hay, corn, or wood, heaped up regularly together (*Swift*). 2. A number of chimneys or funnels standing together (*Wiseman*).

To Stack. *v. a.* (from the noun.) To pile up regularly in ricks (*Mortimer*).

STACKHOUSIA, in botany, a genus of the class pentandria, order trigynia. Calyx five-parted; petals five, united by the claws; capsule three-celled; the cells one-seeded. One species; a shrub of Australasia with flexible branches; yellow, racemed, fascicled flowers.

STADE, a town of Lower Saxony, in the duchy of Bremen, with a fortress, a college, and three churches. It is the principal town of the duchy, subject to the elector of Hanover; Bremen, the capital, being a free imperial town. It is the seat of the regency and chief courts of justice of the duchies of Bremen and Verden; and is seated on the Swingel, near its confluence with the Elbe, 22 miles W. of Hamburgh, and 45 N.E. of Bremen. Lon. 9. 17 E. Lat. 53. 36 N.

STADIUM, Stade, a furlong: it was, according to M. Danet, a space of 125 paces, and the word is derived from the verb *sto*, which signifies to stop; for it is said Hercules run over such a space of ground at one breath, and stopt at the end of it: this sort of measure was peculiar to the Grecians: eight of them goes to an Italian mile. There were stadia of different measures, according to the difference of times and places.

According to the measures of Hipparchus, 769 stades make a degree upon a great circle of the earth, or about $11\frac{2}{3}$ make an English mile. According to the result of Ptolemy's measures, $716\frac{1}{2}$ stades make a degree, or $10\frac{1}{3}$ an English mile. According to Vernon, Stuart, and Chandler, all of whom measured it, the Panathenæan stade was rather more than 600 Greek feet in length. But the Greek foot is to the English foot as 1007·29 to 1000; therefore the length of that stade was about 604·375 English feet; or $9\frac{53}{100}$ Panathenæan stades were equal to an English mile.

For an interesting disquisition on the different kind of stades, see the Quarterly Review, vol. v. pp. 278—293.

STA′DLE. *s.* (ꞅꞇaꝺel, Saxon.) 1. Any thing which serves for support to another. 2. A staff; a crutch: obsolete (*Spenser*). 3. A tree suffered to grow for coarse and common uses, as posts or rails (*Bacon*).

To Sta′dle. *v. a.* (from the noun.) To furnish with stadles (*Tusser*).

STADTHAGEN, a town of Westphalia, in the county of Schauenberg. Here is a palace belonging to the prince of Schauenberg Lippe, in the garden of which is a mineral spring. It is eight miles E. of Minden. Lon. 9. 14 E. Lat. 52. 24 N.

STADTHOLDER, formerly the principal magistrate or governor of the Seven United Provinces. This office was abolished through the ascendancy of France; Holland being first moulded into a monarchy, under the controul of the French emperor, and afterwards made an integral part of France itself.

STÆTALINIA, in botany, a genus of the class syngenesia, order polygamia æqualis. Receptacle with a very short chaff; down feathery, anthers tailed at the base; calyx hemispherical, imbricate. Nine species; natives of the Levant, south of Europe, and Archipelago.

STAFARDA, a town of Piedmont, in the marquisate of Saluzzo, seated on the Po, with a rich abbey. It is famous for a victory gained by the French, in 1690, over the duke of Savoy. Lon. 7. 24 E. Lat. 44. 34 N.

STAFF. *s.* plural *staves.* (ꞅꞇæꝼ, Saxon; *staff*, Danish; *staff*, Dutch.) 1. A stick with which a man supports himself in walking (*Broome*). 2. A prop; a support (*Shaksp.*). 3. A stick used as a weapon; a club (*L'Estr.*). 4. Any long piece of wood (*Addison*). 5.

Round or step of a ladder (*Brown*). 6. An ensign of an office (*Hayward*). 7. (*stef*, Islandic.) A stanza; a series of verses regularly disposed, so as that when the series is concluded, the same order begins again (*Dryden*).

Staff, in military matters, consists of a quarter-master-general, adjutant-general, and majors of brigade. The staff properly exists only in time of war. See Quarter-master-general, &c.

Staff (Regimental), consists in the adjutant, quarter-master, chaplain, surgeon, &c.

Staff, or Stave, in music, the five horizontal and parallel lines on and between which the notes are placed.

Guido, the great improver of the modern music, is said by some to have first used the stave; but others give an earlier date to its introduction. Kircher affirms, that in the jesuit's library at Messina, he found a Greek manuscript of hymns more than seven hundred years old, in which some of the music was written on staves of eight lines, marked at the beginning with eight Greek letters; the notes, or rather points, were on the lines, but no use was made of the spaces. This, however, at most, only deprives Guido of the original invention of the stave, and still leaves him the credit of its great improvement by reducing it to five lines, and employing both lines and spaces.

Staff-tree, in botany. See Celastrus.

STAFFA, a famous island of Scotland, on the W. side of that of Mull, but only one mile in length. The whole S.W. end is supported by ranges of basaltic pillars, mostly above 50 feet high, and four feet in thickness. Here is also the magnificent cavern called Fin-ma-coul, or Fingal's Cave, which extends 250 feet in length. This singular island is every where supported by basaltic rocks and pillars, and so much hollowed by various caves, that its whole surface is shaken in stormy weather. It is the greatest natural curiosity in Europe, if not in the world, yet was scarcely known before the year 1772.

Dr. Von Troil, member of the Stockholm Academy of Sciences, was one of the first persons who had the good fortune to examine the isle of Staffa, and its basaltic constituents, with any degree of accuracy, nor indeed had the public been informed before of the distinguishing marks which render it so highly interesting. Buchanan being then the only author that had noticed this beautiful work of nature, though very slightly. Mr. Pennant, who possessed every requisite talent for informing the world, was disappointed by an adverse wind from visiting Staffa in the year that proved more favourable to Dr. Von Troil, who would have been exactly in the same situation in all probability, had not the tide, which flows with great strength between the western isles of Scotland, compelled the captain of the vessel employed to take him to Iceland, to anchor, on the night of the twelfth of August, in the sound between the Isle of Mull and Morvern on the continent, and precisely opposite to Drumnen, the seat of Mr. Maclean, by whom the Doctor and his friends were immediately invited on shore to breakfast, with the characteristic hospitality of the Highlanders. Mr. Banks, now sir Joseph, being of the party intending to visit Iceland, eagerly accepted, with the Doctor, and others, the offer of Mr. Maclean to conduct them to Staffa, to which they were conveyed by the ship's long boat the same evening, about nine o'clock. "It was impossible," says the Doctor, "for our surprise to be increased, or our curiosity to be fuller gratified, than they were the next morning, when we beheld the no less than beautiful spectacle which nature presented to our view. If we even with admiration behold art, according to the rules prescribed to it, observing a certain kind of order, which not only strikes the eye, but also pleases it, what must be the effect produced upon us when we behold nature displaying, as it were, a regularity which far surpasses every thing art ever produced. An attentive spectator will find as much occasion for wonder and astonishment, when he observes how infinitely short human wisdom appears, when we attempt to imitate nature in this as well as in any other of her grand and awful productions; and though we acknowledge nature to be the mistress of all the arts, and ascribe a greater degree of perfection to them, the nearer they approach and imitate it, yet we sometimes imagine that she might be improved, according to the rules of architecture. How magnificent are the remains which we have of the porticos of the ancients, and with what admiration do we behold the colonnades that adorn the principal buildings of our times; and yet every one who compares them with Fingal's cave, formed by nature in the Isle of Staffa, must readily acknowledge that this piece of nature's architecture far surpasses every thing that invention, luxury, and taste ever produced among the Greeks."

A small cave on the west side of the island affords a convenient landing-place, but there are no regular basalt pillars to be met with in its immediate vicinity. On the south side of it are some narrow pillars, which are inclined, and resemble the springs of the ribs of an arch; beyond those is a small grotto, on the right hand, not composed of pillars, though they appear above it disposed in the manner of the interior parts of the timbers of a ship. At a few yards distance, and opposite to the grotto, extends the peninsula of Bo-scha-la, consisting of regular, but smaller pillars, which are all of a conical figure. Some of these diverge as from a centre, some incline, and others, and by far the greater number, are perpendicular. The island itself, opposite to Bo-scha-la, is composed of thick columns which extend into the sea as far as the eye is able to penetrate, but are not very high, and gradually decrease as they approach the water. Their relative connection is so admirably preserved, that a person may walk upon their ends as conveniently as if ascending or descending the steps of a staircase; these lead to Fingal's or Finhn Mac Coul's cave or grotto, which is excavated out of that mountain from north-east to east.

The cave is formed by regular pillars, extending to a great distance on each side, which support an arch composed of the obtuse points of others, placed very close together; unfortunately the floor of this wonderful place is covered by a body of clear fresh water, several feet in depth, through which may be seen an incredible number of fragments of pillars. The colour of the columns is grey, inclining to black, and the joints are distinguishable by the intervention of a yellow stalactic quarry rind, that exhales, and serves to make the separations more distinct, at the same time that it produces an agreeable effect by many different gradations of colour.

A sufficient degree of light enters the cave to illuminate it to the extremity, where the ranges of pillars are perfectly discernible, and the ebbing and flowing of the tide constantly conveying and discharging air from within it, is at all times fit for respiration, and by no means noxious. This circumstance may still further originate from the passage of the water through a fissure in the rocks, rather lower than the surface, which occasions a rushing sound upon each rise of the tide, that contributes to render the effect of the whole still more singular and impressive. A boat is certainly the most convenient for visiting Fingal's cave, but it is possible to walk into it upon the points of some of the pillars which are higher than the level of the water.

The party already mentioned measured the dimensions of this beautiful grotto, and we acknowledge ourselves indebted to Dr. Von Troil for the following particulars:

	Ft.	In.
The length from the furthest of the basalt pillars, which from the shore formed a canal to the cave, 121 ft. 6 in.; from the commencement of the vault to the end of the cave, 250 ft. - - - - -	371	6
The breadth of its entrance - -	53	7
Of the interior end - - -	20	0
The height of the vault at the entrance of the cave - - -	117	6
Of ditto at the interior end - -	70	0
The height of the outermost pillar in one corner - - - -	39	6
The height of another in the north-west corner - - - -	54	0
The depth of the water at entrance	18	0
Of the inside end - - - - -	9	0
From the water to the foot of the pillars - - - -	36	8
Height of the pillars - - -	32	6
Height of the arch, or vault, above the top of the pillars - - -	31	4
The stratum above - - -	34	4

The western corner of Fingal's cave.

	Ft.	In.
From the water to the foot of the pillars - - - - - -	12	10
Height of the pillars - - -	37	3
The stratum above them - -	66	9
Further west—the stratum beneath the pillars - - - - -	11	0
Height of the pillars - - -	54	0
The stratum above - - -	61	6
Still more westward—stratum beneath the pillars - - -	17	1
Height of the pillars - - -	50	0
The stratum above them - -	51	0
More west—stratum beneath the pillars - - - - - -	19	8
Height of the pillars - - -	55	1
The stratum above - - -	54	7

The stratum beneath the pillars was considered by the party to be no other than tufa, which being heated at the period when this phænomenon was produced, received into its depths fragments of basalt, that above them tinged with red, appears to be lava, containing other fragments scattered in various unequal directions, although it is evident that the most violent heat must have acted upon it, yet there are not the least traces in its exterior, the pillars having been removed by it, for the whole enormous mass rests upon them.

On the north side of the island is another cave, called Corvoranti, where the stratum is raised, and the pillars consequently appear shortened; those are tolerably distinct, and continue so till the intervention of a bay, that extends some distance inland, and there the pillars are discontinued. The mountains in this neighbourhood are composed of dark brown stone, which may or may not be lava; but there is no sort of regularity observable in its texture. On passing further, and on the south-east side of the island, the basalt columnar appearance commences, though almost imperceptibly; hence they gradually assume their characteristic form, till at last the spectator finds himself on the spot where they are in full perfection.

The shape of the columns vary from three to seven sides, though the majority have five and six; the former are so numerous, that a heptagonal pillar is surrounded with seven others, which join closely to seven sides. In some instances inconsiderable fissures may be perceived, but those are generally filled with quartz, and in one particular place that substance had penetrated through several pillars, without interrupting the regularity of their arrangement, one of the greatest wonders attending this operation of nature, is the separation of each pillar into pieces, which are so closely jointed, that it is almost impossible to introduce a knife between the interstices. Upon an attentive examination of many of those pieces, it was found that the uppermost was generally concave, in some cases flat, but very rarely convex. When the upper surface was flat, the lowest joint was the same; but when it was excavated, the lower one was rounded and reversed.

The sides of the pillars are of unequal dimensions, to prove which we shall give the measurement of two, extracted from the Letters on Iceland, containing Dr. Von Troil's communication on this subject.

One with four sides.

	Ft.	In.
First side	1	5
Second	1	1
Third	1	6
Fourth	1	1

With seven sides.

	Ft.	In.
First side	2	10
Second	2	4
Third	1	10
Fourth	2	0
Fifth	1	1
Sixth	1	6
Seventh	1	3

The angles are as sharp and well defined as those of the pillars of the Giant's Causeway in Ireland, and their colour is generally black, the inclination to yellow being confined to the external sides, which are exposed to, and in some degree bleached by the action of the sun, rain, and wind. The texture of their substance much resembles, and is probably the same as the Icelandic agate. Professor Bergman was divided in opinion, whether these pillars were produced by fire acting upon particular substances, or whether subterraneous fires, sending forth vapour, may have softened the superincumbent earth, which becoming soft, and yielding to the force below, ascended in this peculiar form, and became gradually petrified. This latter supposition met the ideas of Von Troil, who illustrates it by saying, he has observed the distinct and regular appearance alluded to in dried clay, and even starch, when dried in a bason. "For," adds the latter, "it may be demonstrated that they are not crystals formed by nature, by their not being produced as all other crystals are, by external apposition (per appositionem), nor in any other matrix, as is common among crystals." He further observes, "The following may, however, serve as a proof that I did not, without due foundation, believe them to be a kind of lava, which burst in growing cold and hard. First, you find both in the island of Staffa, and many other places, that the pillars stand on lava or tufa, and are surrounded by this matter. Secondly, at Staffa there was a large stratum above the pillars, in which there were many pieces of those pillars irregularly thrown one among another, which leaves us to conjecture that they must have been more in number, and higher, after an old eruption of fire; but that a subsequent eruption had overthrown them and mixed them with the whole mass."

STA'FFISH. *a.* (from *staff.*) Stiff; harsh.

STAFFORD, a borough and the county town of Staffordshire, governed by a mayor, with a market on Saturday, and manufactures of cloth and shoes. A castle was built here by William the conqueror, which was garrisoned by the troops of Charles I. and being taken, was demolished by order of the parliament. It has two parish-churches, and a fine square market-place, in which is the shire-hall, and under it is the market-house. In 1801 the inhabitants amounted to 3898. It is seated on the river Sow, 34 miles E.N.E. of Shrewsbury, and 135 N.W. of London. Lon. 2. 4 W. Lat. 52. 48 N.

STAFFORDSHIRE, a county of England, 55 miles long and 42 broad; bounded on the W. by Shropshire, N.W. by Cheshire, N.E. and E. by Derbyshire, S.E. by Warwickshire, and S. by Worcestershire. It contains 780,800 acres; is divided into five hundreds, and 181 parishes; has one city and 19 market-towns; and sends 10 members to parliament. The number of inhabitants in 1801 was 239,153, and in 1811 was 296,523. See Population. The principal rivers are the Trent, Dove, Sow, Churnet, Stour, Peak, and Manyfold. The soil in the S. part is good and rich, though not without heaths, which take up a large tract of ground: it abounds in coal and iron. The middle is level and plain; the N. hilly and barren, being full of heaths and moors, and where they use peat for fuel. There are also good stone quarries, plenty of alabaster, and limestone. This county is famous for its potteries, and for the iron trade in all its varieties.

STAG, or Red deer, in zoology. See Cervus. The stag and hind are the male and female of this tribe, as the buck and doe are of the fallow deer. The latter are mostly natives of parks, and bred for domestic purposes, producing venison for the table; the former are the majestic inhabitants of those extensive tracts called forests and chases, where they are preserved for the purpose of being hunted. The stag, individually surveyed, is one of the grandest and most stately figures in the animal creation. His form is the most beautiful that can be conceived; the elegance of his figure, the commanding effect of his stature, the flexibility of his frame, the elasticity of his limbs, the velocity of his motion, enormity of his strength, in conjunction with the impression made upon the mind by the grandeur of the antlers, branching over his brow, all seem calculated to render him an object of equal attraction and reverence.

The red deer, formerly so plentiful in remote parts of England, in the Highlands of Scotland, and about the Lake of Killarney, in Ireland, are now but very rarely to be found in a wild and unpreserved state any where. They have disappeared with the gradual disappearance of the primæval shades they inhabited. Stags, or hinds, were then found singly, and hunted or pursued by those who happened to find them; but now in the Forest of Windsor, and the New Forest in Hampshire, where they are bred and protected for the royal chase, they assemble together; and upon Ascot Heath, near Swinley Lodge, (the official residence of the master of his majesty's stag hounds,) may be seen the largest herd in the king's dominions.

The colour of both stag and hind is a dingy red, with darker tints about the eyes and mouth: down the upper part of the neck, and over the points of the shoulders, is a shade of dark brown, bordering upon black: the countenance is commandingly expressive: the eye beautifully brilliant, and worthy of the poets notice; and the senses of smelling and hearing equal to those of any animal of this country. When in the least alarmed, the position of the stag is most majestic; he raises his head to the highest pitch, erects his ears, swells his neck, extends his nostrils, and snuffs the air, as if in curious and impatient investigation of the cause by which it was occasioned. Let the alarm be what it may, he never takes to sudden flight, without first measuring, by his eye and ear, the magnitude of the danger, when he proceeds accordingly. If dogs be not of the party, men, cattle, or carriages, seem to give him little or no concern; for, after turning twice or thrice, to take a repeated survey with a kind of confused admiration, he moves off very deliberately, without any discovery of terror.

The pairing season among the deer tribe (see **Rutting time**) commences at the latter end of August and beginning of September, and terminates in the beginning or middle of October; depending, in that respect, a little upon the state of the season, and the age of the different head of deer; those of two and three years old being backwarder, and of course extending the time beyond that of older deer. From conception to parturition, the hind goes nearly nine lunar months; producing in the last week in May, or one of the two first in June. Immediately after impregnation, she separates herself from the stag; no subsequent intercourse takes place; even common association ceases; and nothing during the period of gestation ensues bút mutual and marked indifference. The hind is seldom or never known to produce more than one, (which is called a calf:) this she deposits in the most remote and best sheltered spot she can procure for the purpose of protection from its numerous enemies, amongst whom there is none more determined or malicious than the sire himself. Mysterious as this may appear, it is an unexaggerated fact; and the dam, perfectly conscious of the stag's unnatural propensity, is more industrious to conceal the calf's retreat from him than from all the rest of its other enemies.

The calf, when once it is of strength sufficient to accompany its dam, never leaves her side during the first summer; and through the ensuing winter, none but the hinds, and males under a year old, remain together; the annual separation between the stags and hinds invariably taking place as before described. During the months of infancy, the courage of the dam, in defence of her offspring, is truly astonishing: she opposes every force, encounters every enemy, braves every danger, and hazards her own life to insure the safety of her young. The hind has but little protection upon the score of self-preservation, nature having left her without horns, those useful and ornamental weapons with which the stag is so powerfully armed. The first year the male has no horns; the second they are straight, and single; the third, they shew two branches; the fourth, three; the fifth, four; and the sixth, five; when the stag is reckoned complete, and at his full growth; notwithstanding this, the antlers continue to increase till there are six or seven on each side; and though the age of the deer is mostly ascertained by the number, yet this is not a certain criterion; and we may form a better judgment from the thickness and size of the trunk or body by which they are sustained.

These horns, enormous as they appear, are shed annually, which happens in the latter end of February, or during the month of March; of which there is a most perfect regeneration before the commencement of the rutting time, when the males fight for the hind with the most determined and incredible ferocity. After the season of rutting, the stags having been found too weak to stand long before the hounds, the operation of castration was adopted; and the stag thus deprived of the means of propagation, feeling no stimulative propensity to copulate, is never debilitated, but always ready for the field, and affords runs of great and equal duration at every season. Thus operated upon, they are called heaviers; and it is a remarkable fact, that if a stag be castrated while his antlers are in a state of perfection, they will never exfoliate: on the contrary, if the operation be performed when the head is bare, the horns will never return.

Stag, in cocking, the term for a young game cock during his second year. Through the whole of the first year, he is called a chicken; from which time to the completion of the second, he is a stag; and thenceforward, a cock. In regular matches and mains for considerable sums of money, very few are brought to pit before they are of the last age; unless it is made, and so agreed on both sides, in which case it is called a stag main, or main of stags. See **Cocking**, **Game cock**, and **Cock-pit royal**.

Stag-evil. Convulsive disorder of the tetanus genus, to which horses, of the draught kind more particularly, are subject: it often attacks without the least previous indication. The extensor muscles become instantaneously contracted, and the head is raised to its utmost height, the jaws are fixed, the neck stiff and immoveable, the eyes turned upwards, leaving only the whites visible; the palpitations of the heart are exceedingly violent, and the laborious heavings of the flank incessant. This disorder, difficult as it is in its cause to define, is always more or less dangerous in proportion to the mildness or severity of the attack. If it proceed from a profuse flux of blood to the brain, in consequence of too great and powerful exertions, plentiful bleeding, and calomel purgatives, will be the most expeditious and likely means to relieve.

When its symptoms are so exceedingly severe and alarming, that the jaws are locked, and no medicines can be administered by the mouth, recourse must be had to collateral aids. Strong hot fomentations, with a decoction of aromatic garden herbs, under the jaws, behind the ears, and both sides the throat, followed by fumigations from myrrh, ammoniacum, and assafœtida, grossly powdered, and sprinkled upon a hot iron, or fire-shovel, held below the nostrils; glysters of gruel, in which valerian root has been boiled, and assafœtida dissolved, with an addition of liquid laudanum and olive oil to each, and repeated frequently; are the only means, properly persevered in, that can afford any hope or expectation of success.

STAG-HUNTING: hunting the red-deer with a pack of hounds kept for the express purpose. "At the present day," observes Mr. Daniel, "as an object of chase to the sportsman, the stag requires but cursory mention: those, indeed, who are fond of pomp and parade in hunting, will not accede to this opinion; but the only mode in which this chase can recommend itself to the real sportsman, is, when the deer is looked for, and found, like other game which hounds pursue. At present very few hounds, except those of the royal establishment, are kept exclusively for this amusement; and were the king once to see a fox well found, and killed handsomely, he would, in all probability, give a decided preference in favour of fox-hounds; for what a marked difference is there between conveying, in a covered cart, an animal, nearly as big as the horse that draws it, to a particular spot, where he is liberated, and cheerly riding to the covert side with all the ecstacy of hope and expectation!

"The most impassioned stag-hunter must confess, that no part of his chase admits of poetic description. The only variety he can fairly expect depends upon the wind and the temper of the deer, who, by being either sulky, or not in condition to maintain a contest with the hounds, (to whom he leaves a burning scent, that gives them no trouble in the pursuit,) shortens or extends his gallop; but there is none of the enthusiasm of hunting, which the sportsman feels, when he is following an animal, upon whose own exertions of speed and craftiness his life is staked; and where no stoppages, but the checks arising from the two sources above mentioned, intervene."

STAG HOUNDS are on this account very rarely kept, and the sport but little known in many parts of the kingdom: those of most celebrity are the royal establishment upon Ascot Heath, in Windsor Forest, (see KING'S HOUNDS;) the earl of Derby's, near the Downs, in Surrey; and the subscription pack near Enfield Chase. One great inducement to hunt with stag hounds, is, the certainty of sport, that first object of desire, and not to be insured by a hunt of a different description; another inducement is the gratification of going off with the pack, and covering a scope of country, without perpetual interruption from intervening coverts, where checks, faults, delays, and a repetition of wood riding, so often ensue. Yet stag-hunting, also, has its difficulties, and is by no means a tame pursuit: it is throughout its whole course severe and arduous; laborious to the horse, and in many cases not less so to the rider: obstacles often occur which require great exertions in the one, and great fortitude in the other, and none but those who are resolved to surmount them can lay at all by the side of the hounds.

The scene of turning out the deer is peculiarly grand and impressive. Unless an outlying deer is drawn for, and found in the neighbouring woods, as is sometimes the case, a stag, hind, or heavier, is carted from the paddocks of his majesty at Swinley Lodge, (where they are previously and properly fed for the chase,) and brought at a certain hour, (generally ten o'clock in the morning,) to the place appointed, of which the surrounding neighbourhood have been sufficiently informed. At the distance of a quarter or half a mile from the covered convenience containing the deer, are the hounds, surrounded by the huntsman and his assistants, (called yeoman-prickers,) in scarlet and gold; a part of these having French horns, and upon which they must be good performers.

In a very short time after the hour agreed on, his majesty is seen to approach, attended by the master of the horse, and equerries in waiting; it being the official duty of the master of the stag-hounds to be with them, and ready to receive the king when he arrives. As soon as his majesty resigns his hack, and is remounted for the chase, the huntsman receives a signal from the master of the hounds to liberate the deer. The signal is obeyed at a moment, and the usual law, amounting to about ten minutes, is allowed for the stag's going way: during which interval the sonorous strains of the horns, the musical melodious echo of the hounds, the mutual gratulations of so distinguished an assemblage, and the affability of the sovereign to the loyal subjects who surround him, form a repast truly rich and luxurious to the feelings of the genuine stag-hunter.

A removal of the horse that heads the leading hound at length gives a loose to the body of the pack; and happy he who can lay the nearest to them. Upon the deer's going off from the cart, two of the yeoman-prickers start likewise, in such directions to right and left, as not readily to lose sight of the line he takes; by which means they get five or six miles forward to assist in stopping the hounds at any particular point where they happen to run up to them: were it not indeed for such precaution, not half nor even a third part of the horsemen would ever see the hounds again in the course of the day.

The joyous burst, and jealous velocity of every hound, followed by upwards of a hundred horsemen, all in action at a single view;

the spot embellished with carriages containing ladies, who have come to enjoy the ceremony of turning out; and the emulative exertions of horses and riders, afford a magnificence of sport not easy to be described. At this moment alone is it that the kind of horse best adapted for this particular chase can be clearly ascertained; for out of a hundred, or a hundred and fifty horsemen, seven or eight only will lay any where near, or within a hundred yards of the hounds; the longer the burst, the more the slow-going horses tail; and hence when the hounds are stopt upon the heath, or in an open country, by the few who are up, lines of horsemen are seen behind, more than a mile in length, getting forward in every direction, and resembling various teams of wild ducks crossing from one country to another. Such horses, to whom it is all labour, are so distrest even with the first burst, that if the hounds break away, and the deer cross the country, they are seldom to be seen at the end of a second.

During the time the chase is suspended, and the hounds are at bay, (which is till the king gets up,) the exhilarating sound of the horns is renewed, and the hounds appear as impatient to proceed as at first. After this relief of a few minutes to both hounds and horses, in which they collect their wind, and become proportionally refreshed, the hounds are again permitted to break away, which they do with a redoubled ardour, as if it had absolutely increased by their recent restraint. The same scene of racing and tailing continues during every burst to the close of the chase, in proportion to the length of which the field of horsemen become reduced; while the blood horses only move in perfect unison, and, at their common rating stroke, lay with ease by the side of the hounds. One material difference between this kind of sport and every other arises from the indefatigable exertions here made to save the animal; in all the rest, the summit of happiness being lodged in the power to kill: so that, at any rate, stag-hunting has the plea of humanity in its favour. To obtain this point, the hounds are never known to run from chase to view, every individual is feelingly alive to the danger of the deer, who has so largely and laboriously contributed to the general felicity; and no difficulty at the moment seems too great to encounter, for the preservation of a life in which every spectator feels himself so much concerned. This final burst of a chase is dreadfully severe, particularly if the last mile or two be run in view; at this time the deer exerts his utmost remaining power to take the soil, if water be within his reach: and sometimes with the hounds so close to his haunches, that it is impossible to prevent their plunging with him into the stream. In such predicament, if it be found impracticable to draw off the body of the hounds, in order to insure his safety, the yeoman prickers, and others, are frequently seen above their middles in water, (uncertain of its depth,) to preserve the life of the deer, even at the hazard of their own.

The most moderate chases with the stag extend from an hour and a half to two hours; though a period from three to four hours is by no means uncommon in the course of the season. Horses deficient in speed, heavy in form, full of flesh, or foul in condition, frequently fall martyrs to this laborious exercise. In a severe chase of more than four hours, that occurred not long since, in which the stag was taken at Tilehurst, near Reading, in Berkshire, one horse dropped dead in the field, another died before he could reach a stable, and seven more in the course of a week. It is of the highest consequence, therefore, that the rider should attend to the state of his horse when distressed, and retire in due time from the field. The concluding ceremony of the chase is the preservation of the deer, the baying of the hounds, and a renewed concert of the horns; after which the hounds are drawn off, and the stag, hind, or heavier, deposited in a place of safety.

The regular hunting days with the king's stag hounds are Tuesdays and Saturdays, from Holyrood day (Sept. 25) to the first Saturday in May; except in Christmas and Easter weeks, in each of which there are three hunts. The two grand or most public days are Holyrood day and Easter Monday, when the field is uncommonly numerous; particularly if the weather be favourable and correspond with the occasion.

STAG-BEETLE. See LUCANUS.

STAGE. *s.* (*estage*, French.) 1. A floor raised to view, on which any show is exhibited. 2. The theatre; the place of scenic entertainments (*Knolles*). 3. Any place where any thing is publicly transacted or performed (*Shakspeare*). 4. (*statio*, Latin.) A place in which rest is taken on a journey (*Hammond*). 5. A single step of gradual process (*Rogers*).

To STAGE. *v. a.* (from the noun.) To exhibit publicly: out of use (*Shakspeare*).

STAGECOACH. *s.* (*stage* and *coach.*) A coach that keeps its stages; a coach that passes and repasses on certain days for the accommodation of passengers (*Gay*).

STA′GEPLAY. *s.* (*stage* and *play.*) Theatrical entertainment (*Dryden*).

STA′GEPLAYER. *s.* One who publicly represents actions on the stage (*Arbuthnot*).

STA′GER. *s.* (from *stage.*) 1. A player (*Ben Jonson*). 2. One who has long acted on the stage of life; a practitioner (*Swift*).

STA′GGARD. *s.* (from *stag.*) A four year old stag (*Ainsworth*).

To STA′GGER. *v. n.* (*staggeren*, Dutch.) 1. To reel; not to stand or walk steadily (*Dryden*). 2. To faint; to begin to give way (*Addison*). 3. To hesitate; to fall into doubt (*Ba.*).

To STA′GGER. *v. a.* To make to stagger; to make to reel (*Shakspeare*). 2. To shock; to alarm (*L'Estrange*).

STAGGERS, a disease in the horse, which most authors agree in considering the same with apoplexy. It has, however, been described as consisting of two distinct species, named the sleepy and the mad staggers.

Mr. Denny says, "The disease receives the former of these epithets when the animal becomes inactive, with a heaviness of the eyes, and inclination to sleep; the head resting in the manger, accompanied with costiveness and other symptoms of fever."

The mad staggers are said to exist, "when, without any previous sign of disease, the horse falls down deprived of all voluntary motion, the eyes are insensible to light, the breathing is difficult, with great motion of the flanks, and a quick and full pulse; he often rises, and, after plunging violently in the stable, falls down in the same insensible state.

"It may be occasioned by a disease of the brain, either in the membranes or blood-vessels; from violent exercise, plethora, or rupture of a blood-vessel; or external injuries to the head.

"The danger will be in proportion to the violence of the attack; viz. to the degree in which the powers of sense and motion are affected. The disease is more fatal in old than young horses.

"The first and immediate indication of cure is to take away, from a large orifice in the neck vein, four or five quarts of blood; and to repeat the operation according to the strength of the animal and continuance of the symptoms." The author advises, immediately after, to give a purging ball of calomel and aloes.

"In this disease indeed the bowels are remarkably inactive, and require a large dose of purgative medicine to produce a common effect. If the disease should still continue, a rowel must be put under the jaw and another in the chest: if he refuse mashes, he should be supported with gruel: he should have a large or loose stall, and the stable should be of moderate temperature. When the symptoms are relieved, mashes of bran and oatmeal or malt may be occasionally offered him, with a very small quantity of corn. Hay should be allowed sparingly. One of the rowels at least should be continued a fortnight after the removal of the disease."

Gibson's account of convulsions and staggers from a retention of dung and aliment is not unworthy of our attention. He says it is by no means an uncommon case; and though seldom dangerous where there is no complication with some other disease, yet it sometimes proves fatal, when it happens not to be rightly understood. "And I have known," says he, "in some instances, the stomach and guts so extremely crammed, that it has scarcely been possible to administer any relief.

"These stoppages proceed from various causes, and only affect the head when they happen to be of some continuance: sometimes they are caused by full feeding, with the want of air and sufficient exercise, especially in hot dry weather, and in constitutions naturally hot; but most usually from the nature and qualities of their food, as bad hay, or any other bad provender, as rank clover, when it has imbibed moisture from the damp; which renders them so tough that they lie like a wad, and distend the guts so as to impede their proper functions. Other things have also the same effect, as soiling horses with any kind of green herbage when it chances to be grown too old and tough, and has lost its succulency; especially when it has been cut too long before it is used. Any of these may cause stoppages in the first passages, and sometimes excite such disorders as by their continuance affect the head in a very sensible manner.

"When the staggers and convulsive symptoms arise from such causes, the horse generally looks dull about the head, with his eyes swoln; is feeble, reels and totters as he moves; his mouth is generally stiff, but not quite shut up; he is short-breathed upon the least motion, and, for the most part, has a short cough, because the fulness of the intestines press continually upwards on the lungs, and thereby interrupts respiration; and, as a consequence of this, the motion of the flanks becomes irregular, though seldom violent. For the same reason he scarce ever lies down till some relief is afforded him, because the extreme fulness of the abdomen causes great uneasiness whenever he offers to bend his body, insomuch that many, when they see a horse in this condition, are apt to imagine he has received some hurt in his back or loins. Other signs are costiveness; for he is apt to strain much when he goes to dung, and has many fruitless motions: he stales but little, and that of a dark colour, which often proceeds from the obstructions the gall meets with in its passage from the liver into the duodenum; and thence the jaundice sometimes ensues. Purgative injections, in conjunction with the remedies just prescribed, will be the most effectual plan in all cases of staggers from this cause."

STAGI'RA, a town of European Turkey, in Macedonia, celebrated for being the birthplace of Aristotle, whence he is called the Stagirite. It is now called Stavros, and seated on the gulf of Contessa, 16 miles W.N.W. of Contessa.

STAGI'RITE. See STAGIRA and ARISTOTLE.

STA'GNANCY. *s.* (from *stagnant.*) The state of being without motion or ventilation.

STA'GNANT. *a.* (*stagnans*, Latin.) Motionless; still; not agitated; not flowing; not running (*Woodward*).

To STA'GNATE. *v. a.* (*stagnum*, Latin.) To lie motionless; to have no course or stream (*Arbuthnot*).

STA'GNATION. *s.* (from *stagnate.*) Stop of course; cessation of motion (*Addison*).

STAHL (George Ernest), an eminent German chemist, was born in Franconia in 1660, and chosen professor of medicine at Halle, when a university was founded in that city in 1694. The excellency of his lectures while he filled that chair, the importance of his various publications, and his extensive practice, soon raised his reputation to a very great height. He received an invitation to Berlin in 1716, which having accepted, he was made counsellor of state and physician to the king.

He died in 1734, in the 75th year of his age. Stahl is without doubt one of the greatest men of which the annals of medicine can boast: his name marks the commencement of a new and more illustrious era in chemistry. He was the author of the doctrine of phlogiston, which, though now completely overturned by the discoveries of Lavoisier and others, was not without its use; as it served to combine the scattered fragments of former chemists into a system, and as it gave rise to more accurate experiments and a more scientific view of the subject, to which many of the subsequent discoveries were owing. This theory maintained its ground for more than half a century, and was received and supported by some of the most eminent men which Europe has produced; a sufficient proof of the ingenuity and the abilities of its author. He was the author also of a Theory of Medicine, founded upon the notions which he entertained of the absolute dominion of mind over body; in consequence of which, he affirmed, that every muscular action is a voluntary act of the mind, whether attended with consciousness or not. This theory he and his followers carried a great deal too far, but the advices at least which he gives to attend to the state of the mind of the patient are worthy of the attention of physicians. His principal works are, 1. Experimenta et Observationes Chemicæ et Physicæ, Berlin, 1731, 8vo. 2. Dissertationes Medicæ, Hall, 2 vols. 4to. This is a collection of theses. 3. Theoria Medica vera, 1737, 4to. 4. Opusculum Chymico-physico medicum, 1740, 4to. 5. A Treatise on Sulphur, both Inflammable and Fixed, written in German. 6. Negotium Otiosum, Hall, 1720, 4to. It is in this treatise chiefly that he establishes his system concerning the action of the soul upon the body. 7. Fundamenta Chymicæ Dogmaticæ et Experimentalis, Nuremberg, 1747, 3 vols. 4to. 8. A Treatise on Salts, written in German. 9. Commentarium in Metallurgiam Beccheri, 1723.

STAID. *part. a.* (from *stay.*) Sober; grave; regular; not wild (*Milton*).

STA'IDNESS. *s.* (from *staid.*) Sobriety; gravity; regularity (*Dryden*).

To STAIN. *v. a.* (*ystaenio*, Welsh.) 1. To blot; to spot; to maculate (*Shakspeare*). 2. To die; to tinge. 3. To disgrace; to spot with guilt or infamy (*Milton*).

Stain. *s.* 1. Blot; spot; discolouration (*Addison*). 2. Taint of guilt or infamy (*Broome*). 3. Cause of reproach; shame (*Sidney*).

STA'INER. *s.* (from *stain.*) One who stains; one who blots; one that dies; a dier.

STAINES, a town in Middlesex, with a market on Friday, seated on the Thames, over which is an iron bridge. At some distance above the bridge, at Coln Ditch, is the London mark stone, which is the ancient boundary to the jurisdiction of the city of London on the Thames, and bears the date of 1280. Staines is 16 miles W. by S. of London.

STA'INLESS. *a.* (from *stain.*) 1. Free from blots or spots (*Sidney*). 2. Free from sin or reproach (*Shakspeare*).

STAIR. *s* (ꞅꞇæᵹeꞃ, Sax.; *steghe*, Dutch.) Steps by which we ascend from the lower part of a building to the upper (*Sidney*).

Stair-case, in architecture, an ascent inclosed between walls, or a balustrade, consisting of stairs or steps, with landing-places and rails, serving to make a communication between the several stories of a house. The construction of a complete stair-case is one of the most curious works in architecture.

STAKE. *s.* (ꞅꞇaca, Saxon; *staeck*, Dutch.) 1. A post or strong stick fixed in the ground (*Hooker*). 2. A piece of long rough wood (*Dryden*). 3. Any thing placed as a palisade or fence (*Milton*). 4. The post to which a beast is tied to be baited (*Shakspeare*). 5. Any thing pledged or wagered (*Cowley*). 6. The state of being hazarded, pledged, or wagered (*Hudibras*). 7. The *stake* is a small anvil, which stands upon a small iron foot on the work-bench, to remove as occasion offers; or else it has a strong iron spike at the bottom let into some place of the work-bench, not to be removed (*Moxon*).

To Stake. *v. a.* (from the noun.) 1. To fasten, support, or defend with posts set upright (*Evelyn*). 2. To wager; to hazard (*South*).

STALACTITE. See Stalactites.

Stalactites, in mineralogy, a genus of the class earths, order calcareous. Consisting of carbonat of lime, carbonic acid and water; formed in the air by the gradual deposition of water; diaphonous, without lustre internally, breaking into indeterminate fragments, and separating into concentric crusts; found chiefly on the roofs and sides of arches, and the caverns of calcareous mountains. Four species.

1. S. spatosus. Lime stalactite. Pendulous, lamellar internally, diaphonous. Found in various caves of limestone rocks in Britain, Germany, and other places, white, cinereous, brownish, or yellowish, and of various shapes.

2. S. stiria. Calcareous stalactite. Lime stalactite. Fibrous limestone. Pendulous, in concentric crusts. Three varieties:

α. Cylindrical. Sometimes empty or fistulous, sometimes solid: priapusform, in which case the specimen is denominated priápolite; phallusform, callite, or fungiform.
β. Conic. Empty or fistulous; perforated at the top; or solid.
γ. More or less cylindrical or compressed; resembling the roots of zedoary, Florentine iris, or ginger; in the last case called zingiberite.

Found pendulous from the arches of bridges, and the roofs and sides of caverns and cellars of limestone, and formed by the gradual decomposition and evaporation of water impregnated with lime, which has been more or less inspissated and hardened in the air: colour white, grey, brown, yellowish, opake or transparent.

3. S. stalagmites. Sessile, with spherical faces. Many varieties.

α. Globular, the globules either distinct or joined in pairs.
β. Nodulous.
γ. Kidney-form.
δ. Mamillary.
ε. Carpolites.
ζ. Cauliflower-shaped.
η. Cheriti.
θ. Sceliti.

Found in various calcareous caves and mines.

4. S. solidus. Sessile, solid. Found in the cave of Adrianople and other places, diaphonous, admitting a polish, appearing a little greasy, milk-white, with red, rosy, yellow, brown, or cinereous veins, stripes or spots, sometimes cinereous, red, yellow, brown, rarely blue.

STALA'CTICAL. *a.* Resembling an icicle (*Derham*).

STALAGMITIS, a genus of the monœcia order, in the polygamia class of plants; and in the natural method ranking under the 38th order, tricoccæ. The calyx is either quadriphyllous or hexaphyllous; the corolla consists of four or of six petals; the receptacle is fleshy, and somewhat square-shaped; the filaments about 30. In the hermaphrodite flower the stylus is short, thick, and erect; the fruit is a berry of a globular shape, unilocular, and browned with the stylus and stigma: they contain three oblong jointed triangular seeds. Of this there is only one species, viz. the cambogioides, a native of the East Indies and of the warmer parts of America. From this plant is obtained the gutta cambogia, or gum gamboge of the shops. See GUM RESINS and GAMBOGE.

Till very lately botanists were at a loss for the true nature of the plant which yields this gum. Koenig, a native of Ireland, and an excellent botanist, travelled over a great part of India, and collected a great number of new plants, and among the rest the stalagmitis. These he bequeathed to sir Joseph Banks.

STALBRIDGE, a town in Dorsetshire, with a market on Tuesday, and a manufacture of stockings. Here is an ancient cross of one stone, 21 feet high, on a base of eight feet. It is seated near the Stour, 20 miles N. by E. of Dorchester, and 112 W. by S. of London.

STALE. *a.* (*stelle*, Dutch.) 1. Old; long kept; altered by time (*Prior*). 2. Used till it is of no use or esteem (*Hayward*).

STALE. *s.* (from ꞅꞇælan, Saxon, to steal.) 1. Something exhibited or offered as an allurement to draw others to any place or purpose (*Sidney*). 2. A prostitute (*Shakspeare*). 3. (frome *stale, adj.*) Urine; old urine. 4. Old beer; beer somewhat acidulated. 5. (*stele*, Dutch, a stick.) A handle (*Mortimer*).

To STALE. *v. a.* (from the adjective.) To wear out; to make old (*Shakspeare*).

To STALE. *v. n.* (from the noun.) To make water (*Hudibras*).

STALING, a term used to signify, in a horse or mare, the act of evacuating the urinary bladder. It is a humane and necessary practice to suffer horses to void their urine at full leisure; and to encourage them to it by whistling, or any other of the soothing methods which they may understand. The evacuation of urine is liable to interruption from various causes. See the articles BLADDER, KIDNEYS, URINE, &c.

Horses are seldom subject to stale blood, unless when they have received some strain in the kidneys, or when some blood-vessel has been ruptured about the neck of the bladder, or from some erosion either there or in the urethra, by which some of the small blood-vessels may have been laid open and send forth a bloody discharge; but when this happens, it is generally very small in quantity, and often goes off without the help of medicine. These effects may also proceed from sharp rugged stones in the kidneys, ureters, or about the neck of the bladder; though from what authors have hitherto observed on the subject, horses are not very frequently so affected from this cause, but, for the most part, in consequence of very hard labour or some other ill usage.

In this case the urine becomes bloody, and sometimes even clear blood will pass off just after staling. In order to a cure, if the horse be fat and lusty, it will be proper to bleed plentifully, but if he be low in flesh, more sparingly, or not at all. It has been the practice to follow this by the internal use of mild astringents, which will often cure any horse that stales blood, while the disorder is recent, and when the blood does not proceed from some inward ulceration. It may be repeated until the symptoms go off and the horse stale freely. If the bloodiness of the urine proceed from an affection of the kidneys, neck of the bladder or urethra, which may be known by pain and interruption in staling, and by a purulent sediment in the urine, it must be treated as under those heads, and, if obstinate, with mercurials and such other medicines as may be required.

STA'LELY. *ad.* (from *stale.*) Of old; of long time (*Ben Jonson*).

STA'LENESS. *s.* (from *stale.*) Oldness; state of being long kept; state of being corrupted by time (*Bacon*).

To STALK. *v. a.* (ꞅꞇealcan, Saxon.) 1. To walk with high and superb steps (*Addison*). 2. To walk behind a stalkinghorse or cover (*Bacon*).

STALK. *s.* (from the verb.) 1. High, proud, wide, and stately step (*Addison*). 2. (*stele*, Dutch.) The stem on which flowers or fruits grow. See STEM. 3. The stem of a quill (*Grew*).

STA'LKINGHORSE. *s.* (*stalking* and *horse.*) A horse either real or fictitious, by which a fowler shelters himself from the sight of the game; a mask; a pretence (*Hakewill*).

STA'LKY. *a.* (from *stalk.*) Hard like a stalk.

STALL. *s.* (ꞅꞇeal, Saxon; *stall*, Dutch.) 1. A crib in which an ox is fed, or a horse is kept in the stable (*Chapman*). 2. A bench or form where any thing is set to sale (*Swift*).

3. A small house or shed in which certain trades are practised (*Spenser*). 4. The seat of a dignified clergyman in the choir (*Warburton*).

To Stall. *v. a.* 1. To keep in a stall or stable (*Dryden*). 2. (for *install.*) To invest (*Shakspeare*).

To Stall. *v. n.* 1. To inhabit; to dwell (*Shakspeare*). 2. To kennel.

STA'LLAGE. *s.* (from *stall.*) 1. Rent paid for a stall. 2. (In old books.) Laystall; dung.

STA'LLFED. *a.* (*stall* and *fed.*) Fed not with grass, but dry feed (*Arbuthnot*).

STALLION, a perfect horse, not mutilated by the operation of castration, but preserved in a state of nature, for the purpose of propagation. Stallions should be of great strength, according to the distinct breed they are intended to promote, of correct shape, uniform make, and corresponding symmetry; free from every kind of hereditary taint; have good eyes, long forehand, short back, round barrel, wide chest, straight legs, free from splents before, and spavins behind. Stallions really blind, or with eyes defective, have often been known to produce colts with similar defects; and defects not appearing for their first two or three years, but continuing latent till they have been worked, and their powers brought into action. Not only the above points, however, but the temper and disposition of a stallion should be attended to: vicious and restive horses should unquestionably be equally avoided; since these imperfections also are very frequently transmitted from sire to son, and continued to a distant posterity.

Stallions of the racing kind were never known to have covered at so high a price as at present. Marsk, after the appearance of that prodigy Eclipse, covered a certain number of mares at 100 guineas each; and none now of the first celebrity cover at less than ten, fifteen, or twenty.

STAMEN, in botany. A stamen; in the plural stamens, not stamina, in English. Viscus pro pollinis præparatione. Viscus exterius e ligno. Genitale masculum. Regn. veg. An organ or viscus for the preparation of the pollen; and formed, according to Linnéus, from the wood. It is the third part in the fructification; and consists of the filament and anther. Some English writers call it the chive.

STAMFORD, a borough in Lincolnshire, governed by a mayor, with a market on Monday and Friday. It is seated on the Welland, which is navigable hence, and has a good trade, particularly in malt and freestone. Here subsists the notable custom of borough English, by which the younger sons inherit the lands and tenements of the father dying intestate. Here are six parish churches, and it had formerly a college, whose students removed to Brazen-Nose college, in Oxford. Near Stamford is Burleigh-house, the magnificent seat of the marquis of Exeter. It is 44 miles S. of Lincoln, and 86 N. by W. of London. Lon. 0. 31 W. Lat. 52. 42 N.

STA'MINA. *s.* (Latin.) 1. The first principles of any thing. 2. The solids of a human body.

STAMINEOUS FLOWER, in botany. Stamineus flos. Having no corol: a term used by Ray. Apetalus is the term which Linnéus has adopted from Tournefort. Others call such flowers imperfect or incomplete.

STAMINIFEROUS FLOWER, in botany. Having stamens without a pistil. The same with the male flower of Linnéus. Staminiferous nectary. A nectary having stamens growing on it: as in kleinhovia.

STA'MMEL. *s.* A red colour (*B. Jonson*).

To STA'MMER. *v. n.* (ꞅꞇameꞃ, a stammerer, Saxon; *stamelen, stameren*, Dutch.) To speak with unnatural hesitation; to utter words with difficulty (*Shakspeare*).

STA'MMERER. *s.* (from *stammer.*) One who speaks with hesitation (*Taylor*).

To STAMP. *v. a.* (*stumpen*, Dutch.) 1. To strike by pressing the foot hastily downward (*Dryden*). 2. To pound; to beat as in a mortar (*Bacon*). 3. (*estamper*, Fr.; *stampare*, Italian.) To impress with some mark or figure (*South*). 4. To fix a mark by impressing it (*South*). 5. To make by impressing a mark (*Locke*). 6. To mint; to form; to coin (*Shakspeare*).

To Stamp. *v. n.* To strike the foot suddenly downward (*Dennis*).

Stamp. *s.* (*estampe*, French; *stampa*, Ital.) 1. Any instrument by which a distinct and lasting impression is made (*Waller*). 2. A mark set on any thing; impression (*Locke*). 3. A thing marked or stamped (*Shakspeare*). 4. A picture cut in wood or metal; a picture made by impression (*Addison*). 5. A mark set upon things that pay customs to the government (*Swift*). 6. A character of reputation, good or bad, fixed upon any thing (*South*). 7. Authority; currency; value (*L'Estrange*). 8. Make; cast; form (*Addison*).

Stamp-duties, a branch of the perpetual revenue. See Revenue. The stamp-duties constitute a tax which, though in some instances it may be heavily felt, by greatly increasing the expence of all mercantile as well as legal proceedings, yet (if moderately imposed) is of service to the public in general, by authenticating instruments, and rendering it much more difficult than formerly to forge deeds of any standing; since, as the officers of this branch of the revenue vary their stamps frequently, by marks perceptible to none but themselves, a man that would forge a deed of king William's time must know and be able to counterfeit the stamp of that date also. In France and some other countries the duty is laid on the contract itself, not on the instrument in which it is contained; as, with us too in England (besides the stamps on the indentures), a tax is laid, by statute 8 Ann, c. 9. on every apprentice-fee; of 6*d.* in the pound if it be 50*l.* or under, and 1*s.* in the pound if a greater sum: but this tends to draw the subject into a thousand nice disquisitions and disputes concerning the nature of his contract, and whether taxable or not; in which the farmers of the revenue are sure to have the advantage. Our general method answers the purposes of the state as well, and consults the ease of the subject much better. The first institution of the stamp duties was by statute 5 and 6 William and Mary, c. 21, and they have since, in many instances, been increased to five times their original amount. These duties are on almanacs, on newspapers, legal writings, patent medicines, hats, &c.

STA'MPER. *s.* (from *stamp.*) An instrument of pounding (*Carew*).

STAN, among our forefathers, was the termination of the superlative degree: so *Athelstan,* most noble; *Betstan,* the best; *Wistan,* the wisest (*Gibson*).

To STANCH. *v. a.* (*estancher,* French.) To stop blood; to hinder from running (*Bac.*).

To STANCH. *v. n.* To stop (*Luke*).

STANCH. *a.* (from the verb.) 1. Sound; such as will not run out (*Boyle*). 2. Firm; sound of principle; trusty; hearty; determined (*Addison*). 3. Strong; not to be broken (*Locke*).

STA'NCHER. *s.* (from *stanch.*) One that stops blood.

STANCHIO, a fertile island of the Archipelago, near the coast of Natolia, 40 miles N.W. of Rhodes. It is the ancient Cos, the birthplace of Hippocrates and Apelles; and is 25 miles long and 10 broad. It abounds with cypress and turpentine trees, and a great variety of medicinal plants. The capital, of the same name, is a bishop's see; seated at the foot of a mountain, at the bottom of a bay, and has a good harbour defended by a castle. Lon. 26. 54 E. Lat. 36. 45 N.

STA'NCHION. *s.* (*estançon,* French.) A prop; a support.

STA'NCHLESS. *a.* (from *stanch.*) Not to be stopped (*Shakspeare*).

To STAND. *v. n.* preterit *I stood, I have stood.* (ꞅꞇanꝺan, Saxon; *staen,* Dutch.) 1. To be upon the feet; not to sit, kneel, or lie down (*Common Prayer*). 2. To be not demolished or overthrown (*Milton*). 3. To be placed as an edifice (*Addison*). 4. To remain erect; not to fall (*Milton*). 5. To become erect (*Dryden*). 6. To stop; to halt; not to go forward (*Shakspeare*). 7. To be at a stationary point, without progress or regression (*Pope*). 8. To be in a state of firmness, not vacillation (*Davies*). 9. To be in any posture of resistance or defence (*Shakspeare*). 10. To be in a state of hostility; to keep the ground (*Hayward*). 11. Not to yield; not to give way (*Bacon*). 12. To stay; not to fly (*Clarendon*). 13. To be placed with regard to rank or order (*Arbuthnot*). 14. To remain in the present state (*Dryden*). 15. To be in any particular state (*Milton*). 16. Not to become void; to remain in force (*Hooker*). 17. To consist; to have its being or essence (*Heb.*). 18. To be with respect to terms of a contract (*Carew*). 19. To have a place (*Clarendon*). 20. To be in any state at the time present (*Clarendon*). 21. To be in a permanent state (*Shakspeare*). 22. To be with regard to condition or fortune (*Dryden*). 23. To have any particular respect (*South*). 24. To be without action (*Bacon*). 25. To depend; to rest; to be supported (*Whitgift*). 26. To be with regard to state of mind (*Psalms*). 27. To succeed; to be acquitted; to be safe (*Addison*). 28. To be with respect to any particular (*Shakspeare*). 29. To be resolutely of a party. 30. To be in the place; to be representative (*Locke*). 31. To remain; to be fixed (*Milt.*). 32. To hold a course at sea (*Pope*). 33. To have direction toward any local point (*Boyle*). 34. To offer as a candidate (*Sanderson*). 35. To place himself; to be placed (*Knolles*). 36. To stagnate; not to flow (*Dryden*). 37. To be with respect to chance (*Rowe*). 38. To remain satisfied (*Shakspeare*). 39. To be without motion (*Shakspeare*). 40. To make delay (*Locke*). 41. To insist; to dwell with many words, or much pertinacity (*Maccabees*). 42. To be exposed (*Shakspeare*). 43. To persist; to persevere (*Taylor*). 44. To persist in a claim (*Shakspeare*). 45. To adhere; to abide (*Daniel*). 46. To be consistent (*Felton*). 47. To be put aside with disregard. 48. *To* STAND *by.* To support; to defend; not to desert (*Calamy*). 49. *To* STAND *by.* To be present, without being an actor (*Shakspeare*). 50. *To* STAND *by.* To repose on; to rest in (*Pope*). 51. *To* STAND *for.* To propose one's self a candidate (*Dennis*). 52. *To* STAND *for.* To maintain; to profess to support (*Ben Jonson*). 53. *To* STAND *off.* To keep at a distance (*Dryden*). 54. *To* STAND *off.* Not to comply (*Shakspeare*). 55. *To* STAND *off.* To forbear friendship or intimacy (*Atterbury*). 56. *To* STAND *off.* To have relief; to appear protuberant or prominent (*Wotton*). 57. *To* STAND *out.* To hold resolution; to hold a post; not to yield a point (*Rogers*). 58. *To* STAND *out.* Not to comply; to secede (*Dryden*). 59. *To* STAND *out.* To be prominent or protuberant (*Psalms*). 60. *To* STAND *to.* To ply; to persevere (*Dryden*). 61. *To* STAND *to.* To remain fixed in a purpose (*Herbert*). 62. *To* STAND *to.* To abide by a contract or assertion (*Dryden*). 63. *To* STAND *under.* To undergo; to sustain (*Shakspeare*). 64. *To* STAND *up.* To erect one's self; to rise from sitting. 65. *To* STAND *up.* To arise in order to gain notice (*Acts*). 66. *To* STAND *up.* To make a party (*Shakspeare*). 67. *To* STAND *upon.* To concern; to interest (*Hudibras*). 68. *To* STAND *upon.* To value; to take pride (*Ray*). 69. *To* STAND *upon.* To insist (*Shakspeare*).

To STAND. *v. a.* 1. To endure; to resist without flying or yielding (*Smith*). 2. To await; to abide; to suffer (*Addison*). 3. To keep; to maintain (*Dryden*).

STAND. *s.* (from the verb.) 1. A station; a place where one waits standing (*Addison*). 2. Rank; post; station (*Daniel*). 3. A stop; a halt (*Clarendon*). 4. Stop; interruption (*Woodward*). 5. The act of opposing (*Shakspeare*). 6. Highest mark; stationary point (*Dryden*). 7. A point beyond which one cannot proceed (*Prior*). 8. Difficulty; perplexity;

embarrassment; hesitation (*Locke*). 9. A frame or table on which vessels are placed (*Dryden*).

STA'NDARD. *s.* (*estandart*, French.) 1. An ensign in war, particularly the ensign of the horse (*Milton*). 2. (from *stand.*) That which is of undoubted authority; that which is the best of other things of the same kind (*Sprat*). 3. That which has been tried by the proper test (*Swift*). 4. A settled rate (*Bacon*).

STANDARD or BANNER, in botany. Vexillum. The upper petal of a papilionaceous corol, as in the pea.

STANDARD, on the turf, the name of an instrument by which the exact height of a horse is taken (to the eighth of an inch) when engaged to carry weight for inches, or entered to run for a give and take plate. The standard is about six feet six inches high, and so constructed with a line and pendulum, in the centre of a circle, that no mismeasurement, by fraud or imposition, can take place. It consists of one straight square piece of oak or mahogany, divided, from the top to the bottom, into numerical spaces of four inches each; every space is termed a hand; so that a horse of fifteen hands is precisely five feet high. From the standard branches out horizontally a projecting arm, of about twenty inches, or two feet in length, which sliding upwards or downwards, is raised higher or sunk lower, with the hand, till it rests easily upon the extreme point of the wither; when, by carefully examining the pendulum and figure at the same time, the height of the horse is ascertained with the greatest exactness.

STA'NDARDBEARER. *s.* (*standard* and *bear.*) One who bears a standard or ensign (*Spectator*).

STA'NDEL. *s.* (from *stand.*) A tree of long standing (*Howel*).

STA'NDER. *s.* (from *stand.*) 1. One who stands. 2. A tree that has stood long (*Asch.*). 3. STANDER-*by*. One present; a mere spectator (*Shakspeare*).

STA'NDING. *part. a.* (from *stand.*) 1. Settled; established (*Temple*). 2. Lasting; not transitory (*Addison*). 3. Stagnant; not running (*Milton*). 4. Fixed; not moveable (*Shakspeare*).

STA'NDING. *s.* (from *stand.*) 1. Continuance; long possession of an office, character, or place (*Woodward*). 2. Station; place to stand in (*Knolles*). 3. Power to stand (*Psalms*). 4. Rank; condition.

STA'NDISH. *s.* (*stand* and *dish.*) A case for pen and ink (*Addison*).

STANDON, a town in Hertfordshire, with a market on Friday; seated on the river Rib, eight miles N.E. of Hertford, and 27 N. by E. of London.

STANG. *s.* (ꞅꞇænᵹ, Saxon.) A perch; a measure of land (*Swift*).

STANHOPE, a town in the county of Durham, with a market on Tuesday. It is chiefly inhabited by miners, and seated on the Wear, 20 miles W. of Durham, and 263 N. by W. of London.

STANHOPE (George), an English divine of great talents and piety, was born in Derbyshire, in 1660, and educated at King's college, Cambridge, where he proceeded to his degree of D.D. In 1701 he preached the Boyle's Lecture Sermon, and in 1703 obtained the living of Deptford, in Kent. The same year he was preferred to the deanry of Canterbury. He died in 1728. His writings are truly valuable, and stand in the highest scale of reputation. The principal are, 1. A Paraphrase on the Epistles and Gospels, 4 vols. 8vo. 2. Sermons at Boyle's Lecture, folio. 3. Miscellaneous Sermons. He also translated Thomas a Kempis, and many other esteemed books.

STANHOPE (James, earl), descended from an ancient family, which flourished many ages in the county of Nottingham, was born in 1673. At the siege of Namur in 1695, he distinguished himself so much, that king William gave him a company of foot, and soon afterwards a colonel's commission. In 1705 he was promoted to the rank of brigadier-general, and gained great reputation under the earl of Peterborough at the siege of Barcelona. Soon after the arrival of king George I. he was appointed one of the principal secretaries of state, and of the privy council, and was employed in several important negociations. In 1717 he was appointed first lord of the treasury and chancellor of the exchequer, and afterwards created a peer of Great Britain, and principal secretary of state. He died in 1721.

STANHOPE (Philip Dormer), earl of Chesterfield, was born in 1694. At the age of 18 he was sent to Trinity-hall, Cambridge, where he studied closely, but he remained only two years at the university, for in the spring of 1714 he commenced the tour of Europe, and without a governor. He passed the summer of that year at the Hague, from whence he proceeded to Paris, where, as he himself says, he received his final polish, under the tuition of the belles of that place. He sat in the House of Commons during the two first parliaments of George I. but in 1726, the death of his father removed him to the House of Peers. George II. took him into particular favour, and made him high steward of his household and knight of the garter. In 1745 he was appointed lord lieutenant of Ireland, which he left in 1748, and retired from public life. The chief part of his miscellaneous works bears date after this period. In November 1768, he lost his son, which, with his own infirmities, rendered the remainder of his life very unpleasant. Infidelity could not support him in the time of trial, and he sunk into a state of wretched despondency. He died in 1773. His celebrated Letters to his Son were published in 2 vols. 4to. 1774, and his Miscellaneous Works, in 2 vols. more, in 1777. They display a brilliancy of talent, and much knowledge of the world, but are destitute of principle, and defective in judgment. It has been very forcibly, and we fear too truly, remarked of these letters, that " they inculcate the morals of a whoremaster, with the manners of a dancing master."

STANISLAUS (Leczinski), king of Poland, grand duke of Lithuania, and duke of Lorrain and Bar, was born in 1677. He was early distinguished for his abilities and courage, and when only 20, was sent ambassador extraordinary to the Grand Signor. In 1704 he went ambassador to Charles XII. of Sweden, who had just conquered Poland: this monarch conceived such a friendship for Stanislaus, that he gave him the throne of that kingdom, and caused him to be crowned at Warsaw in 1705. In consequence of the defeat of Charles XII. by the Czar in 1709, Stanislaus was obliged to quit his kingdom, which he never afterwards could regain. His death, which happened in 1766, was occasioned by an accident; his night-gown unfortunately took fire, and before it could be extinguished he was burned so dreadfully that a fever ensued, of which he died. He was the author of a work entitled Œuvres du Philosophe bienfaisant, printed in 1765, 4 vols. 8vo.

Stanislaus (Augustus Poniatowsky), king of Poland, was son of a private gentleman in Lithuania, by the princess Czartorinski, and born 1732. He travelled to Paris, but his expences were so enormous that he was imprisoned for debt, and was liberated only by an act of generosity in the wife of a rich merchant. From Paris he came to London, and became acquainted with sir William Hanbury, whom he accompanied in his embassy to Russia. The elegant person of Poniatowsky captivated the heart of the grand duchess, afterwards Catharine II. which gave so much offence to the empress Elizabeth, that the favourite was recalled by order of Augustus III. of Poland. The death of Augustus, in 1763, interested Catharine in the fortunes of her favourite, and by her influence he was elected king of Poland, 1764. He gained all hearts by his moderation and prudence; but religious disputes disturbed the peace of the kingdom, the dissidents or protestants who had been excluded by the catholics laid claim to new indulgences, and were supported in their petition by England, Prussia, and Russia. Stanislaus favoured their cause, and thus rendered the catholics his enemies, so that they formed the plan of taking him prisoner or destroying him. Three conspirators, at the head of 40 dragoons disguised like peasants, entered Warsaw, 3d November, 1771, and seized the king, and mounting him on a horse, rode away from the town, but during the darkness of the night these assassins lost their road, and on the return of light, Stanislaus found himself in the custody of only one of the conspirators, on whom he prevailed to conduct him back to Warsaw. In 1787 Stanislaus, after an absence of 23 years, had an interview with Catharine, whom he accompanied in her tour through Tauris and Caucasus. Though loaded with honours by this ambitious princess, the Polish king soon saw his dominions invaded by her armies, and in 1792 all his efforts were unable to arrest the career of her arms. Wilna and Warsaw were taken, and Catharine, after having frequently declared herself the protectress of Poland, shared its provinces with Germany and Prussia. In 1795, Repnin delivered a letter to Stanislaus, which commanded him to descend from the throne, and to suffer his people to be degraded from the rank of nations. Stanislaus retired to Grodno, and forgot royalty in private life, and afterwards, on the accession of Paul to the Russian throne, he was sent for to Petersburg, where he died 1798. This unfortunate man, if he had possessed more decision, might have retarded, if not totally averted the dangers, which ruined the monarchy; but he was more calculated to shine in private life than adorn a throne.

STANK. *a.* (*stanco,* Italian.) Weak; worn out (*Spenser*).

Stank. The preterit of *stink*.

STANMORE (Great), a village in Middlesex, two miles N.W. of Edgware. Here is a fine hill, which is so very elevated, that the ground floor of one of the houses is said to be on a level with the battlements of Harrow church; and some high trees here are a seamark from the German Ocean.

Stanmore (Little). See Whitchurch.

STA'NNARY. *a.* (from *stannum,* Latin.) Relating to the tin-works (*Carew*).

Stannaries, the mines and works where tin is dug and purified; as in Cornwall, Devonshire, &c.

Stannary courts, in Devonshire and Cornwall, for the administration of justice among the tinners therein. They are held before the lord-warden and his substitutes, in virtue of a privilege granted to the workers in the tin-mines there, to sue and be sued only in their own courts, that they may not be drawn from their business, which is highly profitable to the public, by attending their law-suits in other courts. The privileges of the tinners are confirmed by a charter, 33 Edward I. and fully expounded by a private statute, 50 Edward III. which has since been explained by a public act, 16 Car. I. c. 15. What relates to our present purpose is only this: That all tinners and labourers in and about the stannaries shall, during the time of their working therein, *bona fide,* be privileged from suits of other courts, and be only pleaded in the stannary court in all matters, excepting pleas of land, life, and member. No writ of error lies from hence to any court in Westminster-hall; as was agreed by all the judges, in 4 Jac. I. But an appeal lies from the steward of the court to the under-warden; and from him to the lord-warden; and thence to the privy council of the prince of Wales, as duke of Cornwall, when he hath had livery or investiture of the same. And from thence the appeal lies to the king himself, in the last resort.

STANNI PULVIS, in medicine, tin finely filed exhibited internally as a vermifuge.

STANNUM. Tin. In mineralogy, a genus of the class metals. Silvery-white, tarnishing in the air, softish, very malleable and ductile, not sonorous, flexible and crackling when bent; specific gravity 7.291; easily melting, and the surface soon becoming covered with a grey powder, which gradually changes to yellow if the heat be continued; in a very violent heat running into a fine white glass; soluble in acids, but not totally in the nitric, giving the solution a bitter taste, and forming a purple precipitate when mixed with a solution of gold. Eight species.

1 S. nativum. Native tin. White, unalloyed, with metallic lustre. Found, though very rarely, in Cornwall and the Scilly Islands, imbedded in quartz, and generally accompanied by tin spar.

2. S. aureum. Of a gold colour, easily burning with a blue flame, and leaving a white oxyd. Found near Gieren in Silesia, intermixed with other fossils, in scarce and small lumps.

3. S. pyriticosum. Tin pyrite, or pyrites. Sulphurised tin. Sulphuret of tin. Yellowish steel-grey, with metallic lustre, of a radiated texture, emitting sulphurous vapours when burnt, and leaving a white oxyd. Found at St. Agnes in Cornwall, where there is a vein nine feet wide, and twenty yards below the surface; texture even, or minutely conchoidal, or radiated, or imperfectly foliated; soft, very brittle, melts before the blowpipe with a sulphurous smell into a black button, and deposits a bluish-white oxyd on the charcoal: specific gravity 4.350: contains, according to Klaproth,

Tin - - - -	34
Copper - - -	36
Sulphur - - -	25
Iron - - - -	3
Earth - - - -	2
	100

4. S. mineralisatum. Native tin spar. Shining opake, milk-white, with a yellowish-white streak. Found near Gieren in Silesia, and in Cornwall, of a common form, or in pyramids, or octahedrons: texture frequently fibrous or lamellar: when fused with borax it produces a milk-white glass: specific gravity 6.007.

5. S, spatosum, Sparry tin. Brown tinstone. Whitish, or brown, lamellar, diaphonous, transparent, or semitransparent. Found in Cornwall, Bohemia, and Saxony, and is often confounded with tungsten; it dissolves in acids and melts with considerable difficulty, and is sometimes so hard as to strike fire with steel; its surface can be scraped with a knife; found in masses, and sometimes crystallized in double four-sided pyramids; colour whitish, various shades of brown, with often a mixture of red: specific gravity 6.900: contains from 70 to 80 per cent. of tin.

6. S. ligneum. Wood tin. Stream tin. Wood tin ore. Holzzin, Klaproth. Pale wood colour, marked with alternate paler striæ, fibrous in a stellate manner, striking fire with steel, separating into layers, breaking into wedge-form fragments. Found in Cornwall in small rounded pieces, with the surface commonly rough, or in indeterminate fragments; colour light-brown with shades of a lighter colour, having the appearance of a piece of knotted wood; texture finely fibrous, with the fibres generally diverging on one side; opake, hard, dissolving slowly in acids, and melting with great difficulty, decrepitating when red-hot: specific gravity from 5.800 to 7.000: contains about 63 per cent. of tin.

7. S. amorphum. Common tinstone. Brown tinstone. Compact, opake, of a common form and dusky colour, with a light grey streak. Found in Cornwall, Devonshire, the Scilly Islands, India, Bohemia, Saxony, Silesia, &c, in masses or rounded pieces: colour dark, or blackish-brown, with various shades of yellowish, or ashy grey, or brownish red; very hard, decrepitates before the blowpipe, and on charcoal is partly reduced: specific gravity from 6.900 to 6.970: contains, according to Klaproth,

Tin - - -	75.50
Oxygen - -	21.50
Iron - - -	.25
Silica - - -	.75
	98.00

8. S. crystallinum. Tinstone. Oxygenised tin. Compact, opake, ponderous, with a light grey streak, in the form of crystals. Found in all tin mines, sometimes very small and clustered together, sometimes in larger regular crystals: colour black or brown, with generally a shining surface, rarely red, yellow, or greenish: sometimes interspersed in quartz, fluor, or other matrices, or loose among the soil or sand: the crystals very irregular, the primitive form of which is supposed to be a cube; but they commonly occur in the shape of double or single four-sided pyramids, with the edges bevilled.

STANTON, a town in Lincolnshire, with a market on Monday, 16 miles E. of Lincoln, and 129 N. of London. Lon. 0. 2 W. Lat. 53. 18 N.

STANTZ, a town of Swisserland, capital of the canton of Underwalden, seated in a plain, at the foot of the Stanzberg, and near the lake of Lucern, 29 miles S. of Zurich. Lon. 8. 22 E. Lat. 46. 51 N.

STANWIX (Fort), in the state of New York, seated on Mohawk river, near its source, 60 miles N.W. of Albany. Lon. 75. 15 W. Lat. 43. 15 N.

STA'NZA. *s*, (*stanza*, Italian; *stance*, French.) A number of lines regularly adjusted to each other; so much of a poem as contains every variation of measure or relation of rhyme (*Dryden*).

STAPEDIUS. (from *stapes*, one of the bones of the ear.) In myology. Stapedæus of Douglas. Musculus stapedis of Winslow. A muscle of the internal ear, which draws the stapes obliquely upwards towards the cavern, by which the posterior part of its base is moved inwards, and the anterior part outwards.

STAPELIA, in botany, a genus of the class pentandria, order digynia. Corol twisted; nectary in the form of a double star covering the fructification. Fifty species; almost all Cape plants: thus subdivided.

A. Corols five-cleft; the divisions hairy at the edges.
B. Corols five-cleft; the segments glabrous at the edges.
C. Corol ten-toothed.
D. Division unknown.

The two following are cultivated.

1. S. hirsuta. Carrion-flower. Hairy stapelia. Corols five-cleft; the segments ovate, acutish villous at the edge; the bottom villous; peduncles round, as long as the corol; branches ascending, four-sided, flowering at the base: flower yellowish, with blackish transverse streaks. The flower smells so abominably, and so nearly in its smell resembles putrid animal flesh, as to deceive the musca vomitocia or flesh-fly, who approaches it and deposits her eggs on it, the larves from which die soon after they are hatched, for want of proper nutriment.

2. S. variegata. Corols five-cleft, wrinkled; the segments ovate, acute; bottom circular, concave, wrinkled; peduncles longer than the corol; branches four-sided, ascending, flowering at the base; flowers of a clearer white, the petals larger. A native of the Cape.

STAPES. (*in quo pes stat.*) A bone of the internal ear, so called from its resemblance to a stirrup.

STAPHILINUS EXTERNUS. See Circumflexus.

STAPHISAGRIA. (ϛαφιϛαγρια, wild vine; from the resemblance of its leaves to those of the vine.) Staphys. Pedicularia. Staves acre. Delphinum staphisagria of Linnéus. Delphinum nectariis tetraphyllis petalo brevioribus, foliis palmatis, lobis otusis. C. O. Polyandria, trigynia. The seeds, which are the only part directed for medicinal use, are usually imported here from Italy: they are large, rough, of an irregular triangular figure, and of a blackish colour on the outside, but yellowish within; their smell is disagreeable, and somewhat fetid; to the taste they are very bitter, acrid, and nauseous. It was formerly employed as a masticatory, but is now confined to external use in some kinds of cutaneous eruptions, but more especially for destroying lice and other insects; hence by the vulgar it is called louse-wort.

STAPHYLEA. Bladder-nut tree. In botany, a genus of the class pentandria, order trigynia. Calyx inferior, five-parted; petals five; capsules inflated, united; seeds two, globular, with a scar. Three species.

1. S. pinnata. Five-leaved bladder-nut.
2. S. trifolia. Three-leaved bladder-nut.
3. S. occidentalis. Jamaica bladder-nut.

The second is a tall shrub or tree, often found wild in our hedges, with white flowers in whorls on long peduncles.

STAPHYLINUS. (ϛαφυλινος; from ϛαφυλη, the uvula.) In anatomy, azygos uvulæ. Epistaphylinus. Palato staphylinus. An azygos muscle of the uvula: it arises flesby from the extremity of the suture which joins the palate bones, runs down the whole length of the velum pendulumpalati, and uvula, resembling an earth-worm, and adhering to the tendons of the circumflexi; is inserted into the tip of the uvula, which, by contracting, it raises upwards, and forwards and shortens it.

Staphylinus, in zoology, a genus of the class insecta, order coleoptera. Antennas moniliform; feelers four; shells half as long as the body; wings folded up under the shells; tail not armed with a forceps, furnished with two exsertile vesicles. A hundred and fifty-six species, thus subdivided.

A. All the feelers filiform.
B. Hind-feelers hatchet-shaped; the tribe oxyporus of Fabricius.
C. Fore-feelers clavate; the tribe pœderus of Fabricius.

The insects of this genus are extremely rapacious, devouring every insect they can catch, and frequently preying on each other: many of them, when attempted to be caught, turn up the tail, the jaws are strong, and exserted, with which they bite and pinch very hard; most of them are found in the greater number of damp places, among putrid substances, and a few upon flowers. In their larve state these insects so much resemble the perfect animal, that they cannot easily be distinguished.

Staphylinus maxillosus is the largest British insect of this genus. The jaws, from which it obtains its specific name, are sharp, hard, and rather longer than the head. The whole insect, both above and below, is of a deep black: the shells do not cover more than one third of the abdomen, which appears beyond them, rough and hairy. The legs are long; each of the tarsi is provided with a tuft of hair resembling a brush. See Nat. Hist. plate CLXXVIII.

STAPHYLOMA. (ϛαφυλωμα; from ϛαφυλη, a grape.) A disease of the cornea of the eye, in which this membrane acquires a preternatural thickness and opacity in its substance. The proximate cause is an effusion of thick humour between the lamellæ of the cornea, so that the internal and external superficies of the cornea very much protuberates. The remote causes are, an habitual ophthalmia, great contusion, and frequently a deposition of the variolous humour in the small-pox. The species are; 1st. Staphyloma totale, which occupies the whole transparent cornea; this is the most frequent species. The symptoms are, the opake cornea protuberates, and if in the form of a cone increasing in magnitude, it pushes out and inverts the lower eyelid; and sometimes the morbid cornea is so elongated as to lay on the cheek, causing friction and excoriation. The bulb of the eye being exposed to the air, sordes generate, the inferior palpebra is irritated by the cilia, and very painful, red, and small papillæ are observable. 2d. Staphyloma racemosum, is a staphyloma formed by carneous tubercles, about the size of a small pin's head. 3d. Staphyloma partiale, which occupies some part of the cornea: it exhibits an opaque tumour prominent from the cornea, similar to a small blueish grape. 4th. Staphyloma scleroticæ, is a blueish tumour attached to some part of the sclerotica, but arising from the tunica albuginea. 5th. Staphyloma pellucidum, in which the cornea is not thickened or incrassated, but very much extended and pellucid. 6th. Staphyloma complicatum, which is complicated with an ulcer, ectropium, caruncles, or any other disorder of the eye. 7th. Staphyloma iridis. For this species, see Ptosis iridis.

STAPLE, primarily signifies a public place or market whither merchants, &c. are obliged to bring their goods to be bought by the people. Formerly the merchants of England were thus obliged to carry their wool, cloth, lead, and other staple-like commodities of this realm, in order to utter the same by wholesale: and these staples were appointed to be constantly kept at York, Lincoln, Newcastle upon Tyne, Norwich, Westminster, Canterbury, Chichester, Winchester, Exeter, and Bristol; in each of which a public mart was appointed to be kept, and each of them had a court of the mayor of the staple, for deciding differences, held according to the law-merchant in a summary way.

The staple-commodities of this kingdom are said by some to be these, viz. wool, leather, wool-fells, lead, tin, butter, cheese, cloth, &c. but others allow only the first five to be staple commodities.

Sta′ple. *a.* (from the noun.) 1. Settled; established in commerce (*Dryden*). 2. According to the laws of commerce (*Swift*).

Sta′ple. *s.* (ꞅꞇapul, Saxon; a prop.) A loop of iron; a bar bent and driven in at both ends (*Peacham*).

STAPLETON (Thomas), a famous English divine of the Roman church, was born in Sussex, in 1535. He received his school education at Canterbury and Winchester, and then was removed to New-college, Oxford, where he obtained a fellowship. On the accession of queen Elizabeth he went abroad, and settled at Louvain, where he was appointed regius professor in divinity, canon of St. Peter's, and dean of Hillerbeck. He died in 1598. His works were published at Paris, in 4 vols. folio, in 1620.

STAPYLTON (Sir Robert), was the third son of Richard Stapylton, of Carleton, in Yorkshire, and was educated a Roman Catholic, in the college of the English Benedictines, at Doway. On his return to England he became a Protestant, and was made gentleman usher of the privy chamber to the prince of Wales, afterwards Charles II. When Charles I. was driven from London by the threatenings and tumults of the discontented, Stapylton accompanied him, and in 1642 was knighted. After the battle of Edgehill our author attended the king to Oxford, where he was created doctor of civil laws. When the royal cause declined, he thought proper to retire, and apply himself to study; but at the Restoration he was again promoted in the service of Charles II. He was the author of several dramatic pieces. He died in 1669. (*Watkins*).

STAR. (*stella.*) In astronomy, a general name for all the heavenly bodies.

The stars are distinguished, from the phenomena, &c. into *fixed* and *erratic* or *wandering*.

Erratic or wandering stars, are those which are continually changing their places and distances, with regard to each other. These are what are properly called planets. Though to the same class may likewise be referred comets or blazing stars.

Fixed stars, called also barely *stars*, by way of eminence, are those which have usually been observed to keep the same distance, with regard to each other.

The chief circumstances observable in the fixed stars are their distance, magnitude, number, nature, and motion. Of each of which in their order.

Distance of the fixed stars.—The fixed stars are so extremely remote from us, that we have no distances in the planetary system to compare to them. Their immense distance appears from hence, that they have no sensible parallax; that is, that the diameter of the earth's annual orbit, which is nearly 190 millions of miles, bears no sensible proportion to their distance.

Mr. Huygens (Cosmotheor. lib. 4) attempts to determine the distance of the stars, by making the aperture of a telescope so small, as that the sun through it appears no larger than Sirius; which he found to be only as 1 to 27664 of his diameter, when seen with the naked eye. So that, were the sun's distance 27664 times as much as it is, it would then be seen of the same diameter with Sirius. And hence, supposing Sirius to be a sun of the same magnitude with our sun, the distance of Sirius will be found to be 27664 times the distance of the sun, or 345 million times the earth's diameter.

Dr. David Gregory investigated the distance of Sirius, by supposing it of the same magnitude with the sun, and of the same apparent diameter with Jupiter in opposition: as may be seen at large in his Astronomy, lib. 3, prop. 47.

Cassini (Mem. Acad. 1717), by comparing Jupiter and Sirius, when viewed through the same telescope, inferred, that the diameter of that planet was 10 times as great as that of the star; and the diameter of Jupiter being 50″, he concluded that the diameter of Sirius was about 5″; supposing then that the real magnitude of Sirius is equal to that of the sun, and the distance of the sun from us 12000 diameters of the earth, and the apparent diameter of Sirius being to that of the sun as 1 to 384, the distance of Sirius becomes equal to 4608000 diameters of the earth.

These methods of Huygens, Gregory, and Cassini, are conjectural and precarious; both because the sun and Sirius are supposed of equal magnitude, and also because it is supposed the diameter of Sirius is determined with sufficient exactness.

Mr. Michell has proposed an enquiry into the probable parallax and magnitude of the fixed stars, from the quantity of light which they afford us, and the peculiar circumstances of their situation. With this view he supposes, that they are, on a medium, equal in magnitude and natural brightness to the sun; and then proceeds to inquire, what would be the parallax of the sun, if he were to be removed so far from us, as to make the quantity of the light, which we should then receive from him, no more than equal to that of the fixed stars. Accordingly, he assumes Saturn in opposition, as equal, or nearly equal in light to the brightest fixed star. As the mean distance of Saturn from the sun is equal to about 2082 of the sun's semidiameters, the density of the sun's light at Saturn will consequently be less than at his own surface, in the ratio of the square of 2082 or 4334724 to 1: If Saturn therefore reflected all the light that falls upon him, he would be less luminous in that same proportion. And besides, his apparent diameter, in the opposition, being but about the 105th part of that of the sun, the quantity of light which we receive from him must be again diminished in the ratio of the square of 105 or 11025 to 1. Consequently, by multiplying these two numbers together, we shall have the whole of the light of the sun to that of Saturn, as the square nearly of 220,000 or 48,400,000,000 to 1. Hence, removing the sun to 220,000 times his present distance, he would still appear at least as bright as Saturn, and his whole parallax upon the diameter of the earth's orbit would be less than two seconds: and this must be assumed for the parallax of the brightest of the fixed stars, upon the supposition that their light does not exceed that of Saturn.

By a like computation it may be found, that the distance, at which the sun would afford us as much light as we receive from Jupiter, is not less than 46,000 times his present distance, and his whole parallax in that case, upon the diameter of the earth's orbit, would not be more than 9 seconds; the light of Jupiter and Saturn, as seen from the earth, being in the ratio of about 22 to 1, when they are both in opposition, and supposing them to reflect equally in proportion to the whole of the light that falls upon them. But if Jupiter and Saturn, instead of reflecting the whole of the light that falls upon them, should really reflect only a part of it, as a 4th, or a 6th, which may be the case, the above distances must be increased in the ratio of 2 or $2\frac{1}{2}$ to 1, to make the sun's light no more than equal to theirs; and his parallax would be less in the same proportion. Supposing then that the fixed stars are of the same magnitude and brightness with the sun, it is no wonder that their parallax should hitherto have escaped observation; since in this case it could hardly amount to 2 seconds, and probably not more than 1 in Sirius himself, though he had been placed in the pole of the ecliptic; and in those that appear much less luminous, as γ Draconis, which is only of the 3d magnitude, it could hardly be expected to be sensible with such instruments as have hitherto been used. However, Mr. Michell suggests, that it is not impracticable to construct instruments capable of distinguishing even to the 20th part of a second, provided the air will admit of that degree of exactness. This ingenious writer apprehends that the quantity of light which we receive from Sirius does not exceed the light we receive from the least fixed star of the 6th magnitude, in a greater ratio than that of 1000 to 1, nor less than that of 400 to 1; and the smaller stars of the 2d magnitude seem to be about a mean proportional between the other two. Hence the whole parallax of the least fixed stars of the 6th magnitude, supposing them of the same size and native brightness with the sun, should be from about $2'''$ to $3'''$, and their distance from about 8 to 12 million times that of the sun: and the parallax of the smaller stars of the 2d magnitude, upon the same supposition, should be about $12'''$, and their distance about 2 million times that of the sun.

This author farther suggests, that, from the apparent situation of the stars in the heavens, there is the greatest probability that the stars are collected together in clusters in some places, where they form a kind of systems, whilst in others there are either few or none of them; whether this disposition be owing to their mutual gravitation, or to some other law or appointment of the Creator. Hence it may be inferred, that such double stars, &c. as appear to consist of two or more stars placed very near together, do really consist of stars placed near together, and under the influence of some general law: and he proceeds to inquire whether, if the stars be collected into systems, the sun does not likewise make one of some system, and which fixed stars those are that belong to the same system with him.

Those stars, he apprehends, which are found in clusters, and surrounded by many others at a small distance from them, belong probably to other systems, and not to ours. And those stars, which are surrounded with nebulæ, are probably only very large stars which, on account of their superior magnitude, are singly visible, while the others, which compose the remaining parts of the same system, are so small as to escape our sight. And those nebulæ in which we can discover either none or only a few stars, even with the assistance of the best telescopes, are probably systems that are still more distant than the rest. For other particulars of this inquiry, see Philos. Trans. vol. 57, pa. 234, &c.

As the distance of the fixed stars is best determined by their parallax, various methods have been pursued, though hitherto without success, for investigating it; the result of the most accurate observations having given us little more than a distant approximation; from which however we may conclude, that the nearest of the fixed stars cannot be less than 40 thousand diameters of the whole annual orbit of the earth distant from us.

The method pointed out by Galileo, and attempted by Hook, Flamsteed, Molyneux, and Bradley, of taking the distances of such stars from the zenith as pass very near it, has given us a much juster idea of the immense distance of the stars, and furnished an approximation to their parallax much nearer the truth than any we had before.

Dr. Bradley assures us (Philos. Trans. num. 406, or Abr. vol. 6, pa. 102), that had the parallax amounted to a single second, or two at most, he should have perceived it in the great number of observations which he made, especially upon γ Draconis; and that it seemed to him very probable, that the annual parallax of this star does not amount to a single second, and consequently that it is above 400 thousand times farther from us than the sun.

But Dr. Herschel seems to have carried the enquiries respecting the real and relative distances of the fixed stars farther than any preceding astronomer. We cannot detail his methods here, but refer, for a brief account, to our article Astronomy, and for a fuller one, to the article Star in Dr. Hutton's Dictionary, or to vol. 72 of the philosophical Transactions.

In a paper on the quantity and velocity of the solar motion in the Phil. Trans. for 1806, Dr. Herschel has assigned the relative distances of 36 fixed stars: these are—Sirius 1.00, Arcturus 1.20, Capella 1.25, Lyra 1.30, Rigel 1 35, Procyon 1.40, Aldebaran 1.40, Pollux 1.42, Spica 1.44, Antares 1.46, Altair 1.47, Regulus 1.48, β Leonis 1.50, β Tauri 1.50, Fomalhaut 1.50, α Cygni 1.60, Castor 2.00, α Ophiuchi 2.00, α Coronæ 2.00, α Serpentis 2.00, α Pegasi 2.00, α Hydra 2.30, α^2 Libræ 2.40, γ Pegasi 2.50, α Arietis 2.50, α Ceti 2.80, α Herculis 3.00, β Virginis 3.00, γ Aquilæ 3.00, α^2 Capricorni 3.50, β Aquilæ 4.00, α′ Capricorni 4.20, α′ Libræ 6.00.

Towards the conclusion of the Doctor's paper he says, "It appears that in the present state of our knowledge of the observed proper motions of the stars, we have sufficient reason to fix upon the quantity of the solar motion to be such as by an eye placed at right angles to its direction, and at the distance of Sirius from us, would be seen to describe annually an arch of 1.″ 116992 of a degree; and its velocity, till we are acquainted with the real distance of this star, can therefore only be expressed by the proportional number of 1116992.

The Doctor's comparative estimate of the distances of the stars is founded upon observations of their relative brightness, a method which though it is by no means a certain one, carries with it so much probability as renders it worthy of attention till some more accurate methods shall be discovered.

Magnitude of the stars. See Astronomy; see also Catalogue and Constellation.

Aberration of the stars. See Aberration.

The number of stars appears to be vastly great, almost infinite; yet have astronomers long ago ascertained the number of those visible to the eye, which are found much fewer than one would imagine. See Catalogue of the stars.

Of the 3000 contained in the Britannic Catalogue, there are many only visible through a telescope; nor does a good eye scarce ever see more than a thousand at the same time in the clearest heaven; the appearance of innumerable more, frequent in clear winter nights, arising from our sight's being deceived by their twinkling, and from our viewing them confusedly, and not reducing them to any order. Yet, notwithstanding this, the stars are really almost infinite. See Halley, on the Number, Order, and Light of the fixed Stars, Phil. Trans. No. 364.

Riccioli makes no scruple to affirm, in his new Almagest, that a man who should say there are above twenty thousand times twenty thousand, would say nothing improbable.

For a good telescope, directed to almost any part of the heavens, discovers numbers that are lost to the naked sight: particularly in the Milky Way, which some suppose to be an assemblage of stars, too remote to be singly seen, but so closely disposed as to give a luminous appearance to that part of the heavens where they are.

The fact, however, is disputed, and the whiteness of the Milky Way must, therefore, be owing to some other cause. See Galaxy.

In the single constellation of the Pleiades, instead of 6, 7, or 8 stars seen by the best eye, Dr. Hooke, with a telescope twelve feet long, told 78, and with larger glasses many more of different magnitudes. And F. de Rheita, a Capuchin, affirms, that he has observed above 2000 stars in the single constellation of Orion.

The same author found above 188 in the Pleiades. And Huygens, looking at the star in the middle of Orion's sword, instead of one found it to be twelve. Galileo found eighty in the space of the belt of Orion's sword, 21 in the nebulous star of his head, and above 500 in another part of him, within the compass of one or two degrees space, and more than 40 in the nebulous star Præsepe.

If an ordinary telescope, therefore, will, in several parts of the heavens, discover ten times as many stars as are visible to the naked eye, what may not be expected from the improved magnifying powers of modern times.

The changes that have happened in the stars are very considerable; contrary to the opinion of the ancients, who held, that the heavens and heavenly bodies were incapable of any change, the matter thereof being permanent and eternal, infinitely exceeding the hardness of diamonds, and not susceptible of any different form. And, in effect, till the time of Aristotle, and even two hundred years afterwards, there had no change been observed. The first was above 120 years before the incarnation; when Hipparchus, discovering a new star to appear, was first induced to make a catalogue of the stars, that posterity might perceive any future changes of the like kind.

In the year 1572, Cornelius Gemma and Tycho Brahe observed another new star in the constellation Cassiopea, which was, likewise, the occasion of Tycho's making a new catalogue. Its magnitude and brightness, at first, exceeded that of the biggest of our stars, Sirius and Lyra; it even equalled that of Venus when nearest the earth, and was seen in fair day-light. It continued sixteen months; towards the latter end whereof it began to dwindle, and at last, viz. March, 1574, totally disappeared, without any change of place in all that time.

Leovicius tells us of another star appearing in the same constellation, about the year 945, which resembled that of 1572, and quotes another ancient observation, whereby it appears, that a new star was seen about the same place in 1264.

Dr. Keil supposes those to have been all the same star.

Fabricius, in 1596, discovered another new star, called the *stella mira*, or wonderful star, in the neck of the whale, which has been since found to appear and disappear periodically seven times in six years, continuing in the greatest lustre for 15 days together; and is never quite extinguished. Its course and motion are described by Bullialdus, in a treatise printed at Paris in 1667.

Herschel in the years 1777, 1778, 1779, and 1780, made several observations on this star, an account of which may be seen in the Phil. Trans. vol. lxx. part ii. art. 21.

In the year 1600, William Jansenius discovered a changeable star in the neck of the Swan, which, in time, became so small as to be thought to disappear entirely, till the years 1657, 1658, and

1659, when it recovered its former lustre and magnitude; but soon decayed, and is now of the smallest size.

In the year 1604, Kepler, and several of his friends, saw a new star near the heel of the right foot of Serpentarius, particularly bright and sparkling; and took notice, that it was every moment changing into some of the colours of the rainbow, except when it is near the horizon, at which time it was generally white. It surpassed Jupiter in magnitude, but was easily distinguished from it, by the steady light of that planet. It disappeared between October, 1605, and the February following, and has not been seen since that time.

Simon Marius discovered another in Andromeda's girdle, in 1612 and 1613; though Bulliald says it had been seen before, in the 15th century.

In July 1670, Hevelius discovered a second changeable star in the Swan, which was so diminished in October as to be scarce perceptible. In April following it regained its former lustre, but wholly disappeared in August. In March 1672 it was seen again, but appeared very small, and has not been visible since.

In 1686 a third changeable star was discovered by Kirchius in the Swan, viz. the Star χ of that constellation, which returned periodically in about 405 days.

In 1672 Cassini saw a star in the neck of the Bull, which he thought was not visible in Tycho's time, nor when Bayer made his figures.

It is certain, from the old catalogues, that many of the ancient stars are not now visible. This has been particularly remarked with regard to the Pleiades.

M. Montanari, in his letter to the Royal Society in 1670, observes that there are now wanting in the heavens two stars of the 2d magnitude, in the stern of the ship Argo, and its yard, which had been seen till the year 1664. When they first disappeared is not known; but he assures us there was not the least glimpse of them in 1668. He adds, he has observed many more changes in the fixed stars, even to the number of a hundred. And many other changes of the stars have been noticed by Cassini, Maraldi, and other observers. See David Gregory's Astron. lib. 2. prop. 30.

But the greatest number of variable stars have been observed of late years, and the most accurate observations made on their periods, &c. by Herschel, Goodricke, Pigott, &c. in the later volumes of the Philos. Trans. particularly in the vol. for 1786, where the last of these gentlemen has given a catalogue of all that have been hitherto observed, with accounts of the observations that have been made upon them.

Various hypotheses have been devised to account for such changes and appearances in the stars. It is not probable they could be comets, as they had no parallax, even when largest and brightest. It has been supposed that the periodical stars have vast dark spots or dark sides, and very slow rotations on their axes, by which means they must disappear when the darker side is turned towards us. And as for those which break out suddenly with such lustre, these may perhaps be suns whose fuel is almost spent, and again supplied by some of their comets falling upon them, and occasioning an uncommon blaze and splendor for some time; which it is conjectured may be one use of the cometary part of our system.

Maupertuis, in his Dissertation on the figures of the Celestial Bodies (p. 61—63), is of opinion that some stars, by their prodigious swift rotation on their axes, may not only assume the figures of oblate spheroids, but that by the great centrifugal force arising from such rotations, they may become of the figures of mill-stones, or be reduced to flat circular planes, so thin as to be quite invisible when their edges are turned towards us, as Saturn's ring is in such position. But when very eccentric planets or comets go round any flat star in orbits much inclined to its equator, the attraction of the planets or comets in their perihelions must alter the inclination of the axis of that star; on which account it will appear more or less large and luminous, as its broad side is more or less turned towards us. And thus he imagines we may account for the apparent change of magnitude and lustre of those stars, and also for their appearing and disappearing.

Hevelius apprehends (Cometograph. pa. 380,) that the sun and stars are surrounded with atmospheres, and that by whirling round their axes with great rapidity, they throw off great quantities of matter into those atmospheres, and so cause great changes in them; and that thus it may come to pass that a star, which, when its atmosphere is clear, shines out with great lustre, may at another time, when it is full of clouds and thick vapours, appear greatly diminished in brightness and magnitude, or even become quite invisible.

Nature of the fixed stars.—The immense distance of the stars leaves us greatly at a loss about the nature of them. What we can gather for certain from their phenomena is as follows:

1st, That the fixed stars are greater than our earth: because if that were not the case, they could not be visible at such an immense distance.

2d, The fixed stars are farther distant from the earth than the farthest of the planets. For we frequently find the fixed stars hid behind the body of the planets: and besides, they have no parallax, which the planets have.

3d. The fixed stars shine with their own light: for they are much farther from the sun than Saturn, and appear much smaller than Saturn; but since, notwithstanding this, they are found to shine much brighter than that planet, it is evident they cannot borrow their light from the same source as Saturn does, viz. the sun; but since we know of no other luminous body beside the sun, whence they might derive their light, it follows that they shine with their own native light.

Besides, it is known, that the more a telescope magnifies, the less is the aperture through which the star is seen; and consequently, the fewer rays it admits into the eye. Now since the stars appear less in a telescope which magnifies two hundred times, than they do to the naked eye, insomuch that they seem to be only indivisible points, it proves at once that the stars are at immense distances from us, and that they shine by their own proper light. If they shone by borrowed light, they would be as invisible without telescopes as the satellites of Jupiter are; for the satellites appear larger when viewed with a good telescope than the largest fixed stars do.

Hence,

1. We deduce that the fixed stars are so many suns; for they have all the characters of suns.

2. That in all probability the stars are not smaller than our sun.

3. That it is highly probable each star is the centre of a system, and has planets or earths revolving round it, in the same manner as round our sun, i. e. it has opake bodies illuminated, warmed, and cherished by its light and heat. As we have incomparably more light from the moon than from all the stars together, it is absurd to imagine that the stars were made for no other purpose than to cast a faint light upon the earth, especially since many more require the assistance of a good telescope to find them out, than are visible without that instrument. Our sun is surrounded by a system of planets and comets, all which would be invisible from the nearest fixed star; and from what we already know of the immense distance of the stars, it is easy to prove, that the sun, seen from such a distance, would appear no larger than a star of the first magnitude.

From all this it is highly probable, that each star is a sun to a system of worlds moving round it, though unseen by us; especially as the doctrine of a plurality of worlds is rational, and greatly manifests the power, the wisdom, and the goodness of the great Creator.

How immense, then, does the universe appear! and how infinitely surpassing our utmost conceptions, the majesty, wisdom, power, and benevolence of the Great Being, who formed and who governs this universe in all its parts!

The most correct and extensive tables of the right ascensions, declinations, and variations of the fixed stars, with which we are acquainted, are given in Hutton's Dictionary, vol. ii. Vince's Astronomy, vol. ii. Wollaston's Astronomical Catalogue, and in the Connaissance des Tems. See the vols. for 1812, 1813, &c. pa. 156—167.

Star, in electricity, denotes the appearance of the electric matter on a point into which it enters. Beccaria supposes that the star is occasioned by the difficulty with which the electric fluid is extricated from the air, which is an electric substance. See Brush.

Star, in fortification, denotes a small fort, having 5 or more points, or saliant and re-entering angles, flanking one another, and their faces 90 or 100 feet long.

Star, in pyrotechny, a composition of combustible matters; which being borne, or thrown aloft into the air, exhibits the appearance of a real star.—Stars are chiefly used as appendages to rockets, a number of them being usually inclosed in a conical cap, or cover, at the head of the rocket, and carried up with it to its utmost height, where the stars, taking fire, are spread around, and exhibit an agreeable spectacle.

To make stars.—Mix 3lbs of saltpetre, 11 ounces of sulphur, one of antimony, and 3 of gunpowder dust: or, 12 ounces of sulphur, 6 of saltpetre, 5½ of gunpowder dust, 4 of olibanum, one of mastic, camphor, sublimate of mercury, and half an ounce of antimony and orpiment. Moisten the mass with gumwater, and make it into little balls, of the size of a chesnut; which dry either in the sun, or in the oven. These being set on fire in the air, will represent stars.

Star-board, denotes the right hand side of a ship, when a person on board stands with the face looking forward towards the head or fore part of the ship. In contradistinction from larboard, which denotes the left hand side of the ship in the same circumstances.—They say, "starboard the helm," or "helm a starboard," when the man at the helm should put the helm to the right hand side of the ship.

Star (Falling), or **shooting star**, a luminous meteor darting rapidly through the air, and resembling a star falling.—The explication of this phenomenon has puzzled all philosophers, till the modern discoveries in electricity have led to the most probable account of it. Signor Beccaria makes it pretty evident that it is an electrical appearance, and recites the following fact in proof of it. About an hour after sunset, he and some friends that were with him observed a falling star directing its course towards them, and apparently growing larger and larger, but it disappeared not far from them; when it left their faces, hands, and clothes, with the earth, and all the neighbouring objects, suddenly illuminated with a diffused and lambent light, not attended with any noise at all. During their surprise at this appearance, a servant informed them that he had seen a light shine suddenly in the garden, and especially upon the streams which he was throwing to water it. All these appearances were evidently electrical; and Beccaria was confirmed in his conjecture, that electricity was the cause of them, by the quantity of electric matter which he had seen gradually advancing towards his kite, which had very much the appearance of a falling star. Sometimes also he saw a kind of glory round the kite, which followed it when it changed its place, but left some light, for a small space of time, in the place it had quitted. Priestley's Elect. vol. 1, pa. 434, 8vo. See Ignis fatuus.

Star-fort, or **Redoubt**, in fortification. See Star, Redoubt, and Fort.

Star-chamber. See Chamber.

Star—is the white centrical spot in the forehead of a horse, directly between, and rather above, the eyes. These are considered great natural ornaments in bays, chesnuts, browns, and blacks; whence dealers are often tempted to make them artificially. This, according to Solleysel, is effected by scraping the hair off carefully with a razor, from the part where the intended star is to appear, when, by wetting the surface with oil of vitriol, an eschar will soon appear, which upon its exfoliation will be followed by a growth of hair of the colour required.

Star apple, in botany. See Chrysophyllum.

Star flower, in botany. See Amellus and Ornithogalum.

Star hyacinth, in botany. See Scilla.

Star of Bethlehem, in botany. See Ornithogalum.

Star of Naples, in botany. See Ornithogalum.

Star thistle, in botany. See Centaurea.

Star wort, in botany. See Aster.

Star-wort (Bastard), in botany. See Buphthalmum.

Star-fish, in helminthology. See Asterias.

Star-gazer, in ichthyology. See Uranoscopus.

Star-stone, in mineralogy, a peculiar petrifaction of the isis or coral. See Helmintholithus.

STARAIA RUSSA, a town of Russia, in the government of Novogorod, seated on the river Polish, not far from the lake Ilmen, 40 miles S. by E. of Novogorod. Lon. 33. 2 E. Lat. 57. 40 N.

STARCH. Amylum. The fecula of wheaten flour. See Amylum.

Starch is one of the constituent parts in all mealy farinaceous seeds, fruits, roots, and other parts of plants. Of these the fæculæ of the ancients for medicinal use are an example. They are mere starch; as for instance the fecula of wake robin (radix ari, aronis); of bryony (bryonia alba); the starch of potatoes (solanum tuberosum); of ságo, from the pitch of the palm landanum; the cassava of the Americans, from the manioc root (jatropha manicot). The salep roots, from a species of orchis, consist for the greatest part of starch. Our common starch is made from wheat. It is not necessary that the grain be first bruised in mills. The entire corn, well cleansed, is soaked in cold water until the husk separates; and the grains, having become quite soft, give out by pressure a milky fluid. The grains are then taken out of the water by means of a sieve, put into a coarse linen sack, and transferred into the treading tub; where they are trodden, after cold water has been poured upon them.

By this operation the starchy part is washed out, and mingling with the water makes it milky. The water is now drawn off, running through a sieve into the settling tub. Fresh water is again effused upon the grains, and the same operation is continued, till the water in the treading tub is no longer rendered milky. The starch here precipitates by repose from the water that held it suspended; during which, especially in a warm season, the mucilaginous saccharine matter of the flour, that was dissolved by the water, goes into the acetous fermentation. From this cause the starch grows still purer and whiter. The water is next let off from the starch, which is several times more washed with clear fresh water; the remaining part of which is suffered to drip through linen cloths supported by hurdles, upon which the wet starch is placed. When the starch has fully subsided, it is wrapt in, wrung between these cloths, or pressed, to extort still more of the remaining liquid.

It is afterwards cut into pieces, which are laid in airy places on slightly burnt bricks to be completely dried, partly by the free currency of air, and partly by the bricks imbibing their moisture. Lastly, the outer crust is scraped off, and they are broken into smaller pieces.

In the sacks wherein the corn was trodden there remain its husks and glutinous parts; and this residuum is employed as food for cattle.

Starch was well known to the ancients. Pliny informs us (lib. xviii. 7.) that the method of obtaining it was first invented by the inhabitants of the isle of Chio.

Starch has a fine white colour, and is usually concreted in longish masses; it has scarcely any smell, and very little taste. When kept dry it continues for a long time uninjured, though exposed to the air. It does not dissolve in cold water, but very soon falls to powder, and forms with it a kind of jelly, which may be diffused through boiling water; but when the mixture is allowed to stand a sufficient time, the starch slowly precipitates to the bottom. This subsidence takes place even when 90 parts of water are employed to dissolve one of starch; but in such case a month at least elapses before the starch begins to precipitate. This solution (if it be entitled to the name) is glutinous in proportion to the quantity of starch. If the quantity be considerable linen, dipt into it and suddenly dried acquires, as is well known, a great degree of stiffness. When the solution is evaporated to dryness, a brittle, opake substance is obtained, differing in appearance from common starch, but exhibiting nearly the same properties with reagents.

Starch neither dissolves nor falls to a powder in alkohol, or ether, even when assisted by heat. The action of oxygen, azote, hydrogen, carbon, and sulphur upon starch has not been examined, but it is not supposed to be very considerable. The metals produce little effect; nor does it combine with the metallic oxyds. Lime-water mixed with a decoction of one part starch to ninety parts water produces no change, and strontian water as little; but barytes throws down a copious white flaky precipitate. This precipitate is redissolved by muriatic acid; but appears again on standing, unless a considerable excess of acid be employed.

When starch is triturated with a hot infusion of nutgalls, a complete solution is effected. The solution is transparent, and the colour rather lighter than the infusion before its mixture with the starch. As it cools however it becomes opake, and lets down a copious crudy precipitate: which a heat of 120° redissolves, when the solution is again transparent, but again deposits the precipitate as it cools.

The decoction of starch is neither altered by potash, carbonat of potash, or ammonia. When starch is thrown into any of the mineral acids, at first no apparent change is visible; but if an attempt be made to reduce the larger pieces, while in the acids, to powder, they resist it, and feel exceedingly tough and adhesive. Sulphuric acid and diluted nitric acid dissolve it slowly; acetic acid does not dissolve it.

M. Parmentier, whose experiments have greatly contributed to an accurate knowledge of starch, has given us the following list of plants from whose roots it may be extracted.

Arctium lappa,
Atropa belladonna,
Polyganum bistorta,
Boyonia alba,
Colchicum autumnale,
Spiræa filipendula,
Ranunculus bulbosus,
Scrophularia nodosa,
Sambucus ebulus,
Sambucus nigra,
Orchis morio,
Imperatoria ostrutheum,
Hyoscyamus niger,
Rumex obtusifolius,
Rumex acutus,
Rumex aquaticus,
Arum maculatum,
Orchis mascula,
Iris pseudochorus,
Iris fætidissima,
Orobus tuberosus,
Bunium bulbocastanum.

It is also found in the following seeds:

Oats,
Maze,
Chesnut,
Peas,
Acorns,
Rice,
Millet,
Horse-chesnut,
Beans.

Indeed the greater number, if not the whole of the vegetable seeds employed by man as an article of food consist chiefly of starch. But it is always combined with some other substance which serves to disguise its properties, as sugar, oil, extractive, &c.

We have already noticed that salep is a variety of starch, that another variety of it is obtained from the bulbs of potatoes, and the roots of the jatropha manicot. Sago is a fourth variety, which is extracted from the pith of several species of palm in the Moluccas, Philippines, and other East Indian islands. The palm is cut into pieces of five or six feet in length; the woody part is split off on one side, thus exposing the pith as in the hollow of a canoe. Cold water is next poured in, and the pith well stirred; by which means the starch is separated from the fibrous part, and passes through with the water, when the whole is thrown on a searce. The sago thus separated is allowed to settle; the water is poured off; and when it is half dry it is granulated by being forced through a kind of funnel.

Sowans is another variety of starch; a nutritive article of food in Scotland, and obtained from the husk of oats by a process not unlike that for the manufacture of common starch.

To STARCH. *v. a.* (from the noun.) To stiffen with starch (*Gay*).

STA′RCHED. *a.* (from *starch.*) 1. Stiffened with starch. 2. Stiff; precise; formal (*Swift*).

STA′RCHER. *s.* (from *starch.*) One whose trade is to starch.

STA′RCHLY. *ad.* (from *starch.*) Stiffly; precisely.

STA′RCHNESS. *s.* (from *starch.*) Stiffness; preciseness.

To STARE. *v. n.* (ꞅꝫaꞃian, Sax. *sterren*, Dutch.) 1. To look with fixed eyes; to look with wonder, impudence, confidence, stupidity, or horrour (*Spenser*). 2. *To* STARE *in the face.* To be undeniably evident (*Locke*). 3. To stand out prominent (*Mortimer*).

STARE. *s.* (from the verb.) Fixed look (*Dryden*).

STARE, or STARLING. See STURNUS.

STARER. *s.* (from *stare.*) One who looks with fixed eyes (*Pope*).

STARGARD, a town of Upper Saxony, in Prussian Pomerania, with a college, and the ruins of a castle. It has manufactures of serges, shaloons, tammies, druggets, &c. and is seated on the Ihna, 18 miles S.E. of Stetin, and 37 N.W. of Landsperg. Lon. 25. 8 E. Lat. 53. 32 N.

STARGARD, a town of Germany, in Mecklenburg Strelitz, 30 miles S. of New Brandenburg.

STA′RGAZER. *s.* (*star* and *gaze.*) An astronomer, or astrologer. In contempt (*L'Estrange*).

STARK. *a.* (ꞅꝫeꞃc, ꞅꝫaꞃc, Saxon; *sterck*, Dutch.) 1. Stiff; strong; rugged (*Denham*). 2. Deep; full; still (*Ben Jonson*). 3. Mere; simple; plain; gross (*Collier*).

STARK. *ad.* Is used to intend or augment the signification of a word; as, *stark* mad, mad in the highest degree (*Donne*).

STARKEA, in botany, a genus of the class syngenesia, order polygamia superflua. Receptacle rough-haired; down sessile, simple; calyx imbricate. One species only, a Jamaica plant, with herbaceous, erect, simple, hairy stem; leaves somewhat decurved, serrate, nerved; flowers umbelled, yellow.

STA′RKLY. *ad.* (from *stark.*) Stiffly; strongly (*Shakspeare*).

STA′RLESS. *a.* (from *star.*) Having no light of stars (*Milton*).

STA′RLIGHT. *s.* (*star* and *light.*) Lustre of the stars (*Milton*).

STA′RLIGHT. *a.* Lighted by the stars (*Dryden*).

STA′RLIKE. *a.* (*star* and *like.*) 1. Stellated; having various points, resembling a star in lustre (*Mortimer*). 2. Bright; illustrious (*Boyle*).

STARLING. See STURNUS.

STA′RPAVED. *a.* (*star* and *pave.*) Studded with stars (*Milton*).

STA′RPROOF. *a.* (*star* and *proof.*) Impervious to starlight (*Milton*).

STA′RREAD. *s.* (*star* and *read.*) Doctrine of the stars; astronomy (*Spenser*).

STA′RRED. *a.* (from *star.*) 1. Influenced by the stars with respect to fortune (*Shakspeare*). 2. Decorated with stars (*Milton*).

STA′RRY. *a.* (from *star.*) 1. Decorated with stars (*Pope*). 2. Consisting of stars; stellar (*Dryden*). 3. Resembling stars.

STA′RRING. *a.* (from *star.*) Shining with stellar light (*Crashaw*).

STA′RSHOOT. *s.* (*star* and *shoot.*) An emission from a star (*Boyle*).

To **START.** *v. n.* (*startzen*, German.) 1. To feel a sudden and involuntary twitch or motion of the animal frame, on the apprehension of danger (*Bacon*). 2. To rise suddenly (*Roscommon*). 3. To move with a sudden quickness (*Pope*). 4. To shrink; to winch (*Shakspeare*). 5. To deviate (*Creech*). 6. To set out from the barrier at a race (*Denham*). 7. To set out on any pursuit (*Waller*).

To **Start.** *v. a.* 1. To alarm; to disturb suddenly (*Shakspeare*). 2. To make to fly hastily from a hiding place; to rouse by a sudden disturbance (*Shakspeare*). 3. To bring into motion; to produce to view or notice (*Sprat*). 4. To discover; to bring within pursuit (*Temple*). 5. To put suddenly out of place (*Wiseman*).

Start. *s.* (from the verb.) 1. A motion of terrour; a sudden twitch or contraction of the frame from fear or alarm (*Dryden*). 2. A sudden rousing to action; excitement (*Shakspeare*). 3. Sally; vehement eruption; sudden effusion (*L'Estrange*). 4. Sudden fit; intermitted action (*Ben Jonson*). 5. A quick spring or motion (*Grew*). 6. First emission from the barrier; act of setting out (*Bacon*). 7. *To get the* Start. To begin before another; to obtain advantage over another (*Bacon*).

Start point, a promontory of Devonshire, in the English Channel, 14 miles S. by W. of Dartmouth. Lon. 3. 51 W. Lat. 50. 9 N.

STA'RTER. *s.* (from *start.*) 1. One that shrinks from his purpose (*Hudibras*). 2. One who suddenly moves a question or objection. 3. A dog that rouses the game (*Delany*).

STARTING, in the manage. A horse is said to start that is skittish, or timorous, and that takes every object he sees to be otherwise than it is. He stops, flies out, and runs suddenly to one side, insomuch that the rider cannot make him approach the place where the object is. This fault frequently arises from bad treatment, but it is more common to geldings than stone-horses. Such horses also as have had bad eyes are particularly subject to it, as well as those that have been kept a long time in a stable without airing; but these last are easily cured of it. A skittish horse should never be beaten in his terror, but made to advance gently and with soothing means, to the object that alarms him, till he recovers and gains confidence.

STA'RTINGLY. *ad.* (from *starting.*) By sudden fits; with frequent intermission (*Shakspeare*).

STA'RTINGPOST. *s.* (*start* and *post.*) Barrier from which the race begins.

To **STA'RTLE.** *v. n.* (from *start.*) To shrink; to move on, feeling a sudden impression of alarm or terrour (*Addison*).

To **Sta'rtle.** *v. a.* 1. To fright; to shock; to impress with sudden terrour, surprise, or alarm (*Milton*). 2. To deter; to make to deviate (*Clarendon*).

Sta'rtle. *s.* (from the verb.) Sudden alarm; shock; sudden impression of terrour (*Spectator*).

STA'RTUP. *s.* (*start* and *up.*) One that comes suddenly into notice (*Shakspeare*).

To **STARVE.** *v. n.* (ꞅꞇeaꞃꝼan, Sax. *sterven*, Dutch, to die.) 1. To perish; to be destroyed (*Fairfax*). 2. To perish with hunger (*Locke*). 3. To be killed with cold (*Sandys*). 4. To suffer extreme poverty (*Pope*). 5. To be destroyed with cold (*Woodward*).

To **Starve.** *v. a.* 1. To kill with hunger (*Prior*). 2. To subdue by famine (*Arbuthnot*). 3. To kill with cold (*Milton*). 4. To deprive of force or vigour (*Locke*).

STA'RVELING. *a.* (from *starve.*) Hungry; lean; pining (*Swift*).

Sta'rveling. *s.* An animal thin and weak for want of nourishment (*Donne*).

STA'RWORT. *s.* (*aster*, Latin.) Elecampane.

STA'TARY. *a.* (from *status*, Lat.) Fixed; settled (*Brown*).

STATE. *s.* (*status*, Lat.) 1 Condition; circumstance of nature or fortune (*Milton*). 2. Modification of any thing (*Boyle*). 3. Stationary point; crisis; height (*Wiseman*). 4. Estate; signiory; possession (*Daniel*). 5. The community; the public; the commonwealth (*Shakspeare*). 6. A republic; a goverment not monarchical (*Temple*). 7. Rank; condition; quality (*Fairfax*). 8. Solemn pomp; appearance of greatness (*Roscommon*). 9. Dignity; grandeur (*Milton*). 10. A seat of dignity (*Shakspeare*). 11. A canopy; a covering of dignity (*Bacon*). 12. A person of high rank (*Latimer*). 13. The principal persons in the government (*Milton*). 14. Joined with another word it signifies public; as, *state* affairs (*Bacon*).

To **State.** *v. a.* (*constater*, Fr.) 1. To settle; to regulate (*Collier*). 2. To represent in all the circumstances of modification (*Hammond*).

STA'TELINESS. *s.* (from *stately.*) 1. Grandeur; majestic appearance; august manner; dignity (*More*). 2. Appearance of pride; affected dignity (*Betterton*).

STA'TELY. *a.* (from *state.*) 1. August; grand; lofty; elevated (*Raleigh*). 2. Elevated in mien or sentiment (*Dryden*).

Sta'tely. *ad.* Majestically (*Milton*).

STATEN ISLAND, an island of N. America, which forms the county of Richmond, in the state of New York. It is 18 miles long and six broad, and contains upward of 3000 inhabitants. On the S. side is a considerable tract of level land; but, in general, this island is rough, and the hills high. Richmond is its only town of any note.

Staten Land, a barren craggy island, on the S.E. side of the islands which form the straits of Magellan, in 55° S. lat. Between this island and Tierra del Fuego is the strait of Le Maire.

STATES, or **Estates**, a term applied to several orders or classes of people assembled to consult of matters for the public good. Thus states-general is the name of an assembly formerly consisting of the deputies of the seven United Provinces. These were usually 30 in number, some provinces sending two, others more; and whatever resolution the states-general took, was confirmed by every province, and by every city and republic in that province, before it had the force of a law. The deputies of each province, of what number soever they were, had only one voice, and were esteemed as but one person, the votes being given by provinces. Each province presided in the assembly in its turn, according to the order settled among them. Guelderland presided first, then Holland, &c.

STA'TESMAN. *s.* (*state* and *man.*) 1. A politician; one versed in the arts of government (*Ben Jonson*). 2. One employed in public affairs (*South*).

STA'TESWOMAN. *s.* A woman who meddles with public affairs (*Ben Jonson*).

STA'TICAL. STA'TIC. *a.* (from *statics.*) Relating to the science of weighing (*Arbuthnot*).

STATICE. Thrift. Sea-lavender. In botany, a genus of the class pentandria, order pentagynia. Calyx one-leaved, entire, plaited, scarious; petals five; seed one, superior. Thirty-seven species; chiefly natives of Europe, and the Levant; many of them found on the sea-coast, three on the coast of our own country. The following are cultivated.

1. S. armeria. Thrift, or sea-gilliflower. Found wild on our own coasts.

2. S. limonium. Sea-thrift, or sea-lavender. Found also on our shores.

3. S. cordata. Heart-leaved sea-lavender.

4. S. reticulata. Matted sea-lavender.

5. S. echioides. Rough-leaved sea-lavender.

6. S. speciosa. Plantain-leaved sea-lavender.

7. S. Tartarica. Tartarian sea-lavender.

8. S. pectinata. Triangular-stalked sea-lavender.

9. S. suffruticosa. Narrow-leaved shrubby sea-lavender.

10. S. monopetala. Broad-leaved shrubby sea-lavender.

11. S. ferulacea. Cut-leaved sea-lavender.

12. S. sinuata. Scollop-leaved sea-lavender.

All the roots are capable of being increased by parting, or slipping the roots. They may be also raised from seeds; but the seeds for the foreign sorts should be obtained from abroad.

STATICS, a term which the modern improvements in knowledge have made it necessary to introduce into physico-mathematical science. It was found convenient to distribute the doctrines of universal mechanics into two classes, which required both a different mode of consideration and different principles of reasoning.

Till the time of Archimedes little science of this kind was possessed by the ancients, from whom we have received the first rudiments. His investigation of the centre of gravity, and his theory of the lever, are the foundations of our knowledge of common mechanics; and his theory of the equilibrium of floating bodies contains the greatest part of our hydrostatical knowledge. But it was as yet limited to the simplest cases; and there were some in which Archimedes was ignorant, or was mistaken. The marquis Guido Ubuldi, in 1578, published his theory of mechanics, in which the doctrines of Archimedes were well explained and considerably augmented. Stevinus, the celebrated Dutch engineer, published, about twenty years after, an excellent system of mechanics, containing the chief principles which now form the science of equilibrium among solid bodies. In particular, he gave the theory of inclined planes, which was unknown to the ancients, though it is of the very first importance in almost every machine. He even states in the most express terms the principle afterwards made the foundation of the whole of mechanics, and published as a valuable discovery by Varignon, viz. that three forces, whose directions and intensities are as the sides of a triangle, balance each other. His theory of the pressure of fluids, or hydrostatics, is no less estimable, including every thing that is now received as a leading principle in the science. When we consider the ignorance, even of the most learned, of that age in mechanical or physico-mathematical knowledge, we must consider those performances as the works of a great genius, and we regret that they are so little known, being lost in a crowd of good writings on those subjects which appeared soon after.

Hitherto the attention had been turned entirely to equilibrium, and the circumstances necessary for producing it. Mechanicians indeed saw, that the energy of a machine might be somehow measured by the force which could be opposed or overcome by its intervention; but they did not remark, that the force which prevented its motion, but did no more than prevent it, was an exact measure of its energy, because it was in immediate equilibrio with the pressure exerted by that part of the machine with which it was connected. If this opposed force was less, or the force acting at the other extremity of the machine was greater, the mechanicians knew that the machine would move, and that work would be performed; but what would be the rate of its motion or its performance, they hardly pretended to conjecture. They had not studied the action of moving forces, nor conceived what was done when motion was communicated.

The great Galileo opened a new field of speculation in his work on Local Motion. He there considers a change of motion as the indication and exact and adequate measure of a moving force; and he considers every kind of pressure as competent to the production of such changes. He contented himself with the application of this principle to the motion of bodies by the action of gravity, and gave the theory of projectiles, which remains to this day without change, and only improved by considering the changes which are produced in it by the resistance of the air.

Sir Isaac Newton took up this subject nearly as Galileo had left it. For, if we except the theory of the centrifugal forces arising from rotation, and the theory of pendulums, published by Huygens, hardly any thing had been added to the science of motion. Newton considered the subject in its utmost extent; and in his mathematical principles of natural philosophy he considers every conceivable variation of moving force, and determines the motion resulting from its action. His first application of these doctrines was to explain the celestial motions; and the magnificence of this subject caused it to occupy for a while the whole attention of the mathematicians. But the same work contained propositions equally conducive to the improvement of common mechanics, and to the complete understanding of the mechanical actions of bodies. Philosophers began to make these applications also. They saw that every kind of work which is to be performed by a machine may be considered abstractedly as a retarding force; that the impulse of water or wind, which are employed as moving powers, act by means of pressures which they exert on the impelled point of the machine; and that the machine itself may be considered as an assemblage of bodies moveable in certain limited circumstances, with determined directions and proportions of velocity. From all these considerations resulted a general abstract condition of a body acted on by known powers. And they found, that after all conditions of equilibrium were satisfied, there remains a surplus of moving force. They could now state the motion which will ensue, the new resistance which this will excite, the additional power which this will absorb; and they at last determined a new kind of equilibrium, not thought of by the ancient mechanicians, between the resistance to the machine performing work and the moving power, which exactly balance each other, and is indicated, not by the rest, but by the uniform motion of the machine. In like manner, the mathematician was enabled to calculate that precise motion of water which would completely absorb, or, in the new language, balance the superiority of pressure by which water is forced through a sluice, a pipe, or canal, with a constant velocity.

Thus the general doctrines of forces came to be considered in two points of view, according as they balanced each other in a state of rest or of uniform motion. These two ways of considering the same subject required both different principles and a different manner of reasoning. The first has been named Statics, as expressing that rest which is the test of this kind of equilibrium. The second has been called Dynamics, or Universal Mechanics, because the different kinds of motion are characteristic of the powers or forces which produce them. A knowledge of both is indispensably necessary to acquiring any useful practical knowledge of machines; and it was ignorance of the doctrines of accelerated and retarded motion which made the progress of practical mechanical knowledge so very slow and imperfect. The mechanics, even of the moderns, before Galileo, went no farther than to state the proportion of the power and resistance which would be balanced by the intervention of a given machine, or the proportion of the parts of a machine, by which two known forces may balance each other. This view of the matter introduced a principle, which even Galileo considered as a mechanical axiom, viz. that what is gained in force, by means of a machine, is exactly compensated by the additional time which it obliges us to employ. This is not quite accurate, and not only prevents improvement in the construction of machines, but leads to erroneous maxims of construction. The two principles of dynamics teach us, that there is a certain proportion of the machine dependent on the kind and proportion of the power and resistance, which enables the machine to perform the greatest possible work. It is highly proper, therefore, to keep separate these two ways of considering machines, that both may be improved to the utmost, and then to blend them together in every practical discussion. Statics, therefore, is preparatory to the proper study of mechanics; but it does not hence derive all its importance. It is the sole foundation of many useful parts of knowledge. This will be best seen by a brief enumeration. 1. It comprehends all the doctrines of the excitement and propagation of pressure, through the parts of solid bodies, by which the energies of machines are produced. A pressure is exerted on the impelled point of a machine, such as the float-boards or buckets of a mill-wheel. This excites a pressure at the pivots of its axle, which acts on the points of support. This must be understood, both as to direction and intensity, that it may be effectually resisted. A pressure is also excited at the acting tooth of the cog-wheel, on the same axle, by which it urges round another wheel, exerting similar pressures on its pivots, and on the acting tooth, perhaps, of a third wheel. Thus a pressure is ultimately excited in the working point of the machine, perhaps a wiper, which lifts a heavy stamper, to let it fall again on some matter to be pounded. Now statics teaches us the intensities and direction of all those pressures, and therefore how much remains at the working point of the machine unbalanced by resistance. 2. It comprehends every circumstance which influences the stability of heavy bodies; the investigation and properties of the centre of gravity; the theory of the construction of arches, vaults, and domes; the attitudes of animals. 3. The strength of materials, and the principles of construction, so as to make the proper adjustment of strength and strain, in every part of a machine, edifice, or structure of any kind. Statics, therefore, furnishes us with what may be called a theory of carpentry, and gives us proper instructions for framing floors, roofs, centres, &c. 4. Statics comprehends the whole doctrine of the pressure of fluids, whether liquid or æriform, whether arising from their weight, or from any external action. Hence, therefore, we derive our knowledge of the stability of ships, or their power of maintaining themselves in a position nearly upright, in opposition to the action of the wind on their sails. We learn on what circumstances of figure and stowage this quality depends, and what will augment or diminish it.

We cannot here devote space sufficient to the subject to treat it as it deserves; but we believe we may safely recommend book 1. of Dr. Gregory's Mechanics, as containing by far the most comprehensive and complete treatise upon statics in its several branches which has yet been published in the English language.

STA'TION. *s.* (*statio*, Lat.) 1. The act of standing (*Hooker*). 2. A state of rest (*Brown*). 3. A place where any one is placed (*Hayward*). 4. Post assigned; office (*Milton*). 5. Situation; position (*Prior*). 6. Employment; office (*Swift*). 7. Character; state (*Milton*). 8. Rank; condition of life (*Dryden*).

STATION, or STATIONARY, in astronomy, the position or appearance of a planet in the same point of the zodiac, for several days. This happens from the observer being situated on the earth, which is far out of the centre of their orbits, by which they seem to proceed irregularly; being sometimes seen to go forwards, or from west to east, which is their natural direction; sometimes to go backwards, or from east to west, which is their retrogradation; and between these two states there must be an intermediate one, where the planet appears neither to go forwards nor backwards, but to stand still, and keep the same place in the heavens, which is called her station, and the planet is then said to be stationary. See APPARENT.

Apollonius Pergæus has shewn how to find the stationary point of a planet, according to the old theory of the planets, which supposes them to move in epicycles; which was followed by Ptolemy in his Almag. lib. 12. cap. 1. and others, till the time of Copernicus. Concerning this, see Regiomontanus in Epitome Almagesti, lib. 12. prop. 1; Copernicus's Revolutiones Cœlest. lib. 5, cap. 35 and 36; Kepler in Tabulis Rudolphinis, cap. 24; Riccioli's Almag. lib. 7, sect. 5, cap. 2; Herman in Miscellan. Berolinens. pa. 197. Dr. Halley, Mr. Facio, Mr. De Moivre, Dr. Keil, D. and O. Gregory, Vince, Woodhouse, and others, have treated this subject.

STATION, in practical geometry, &c. is a place pitched upon to make an observation, or take an angle, or such like, as in surveying, measuring heights and distances, levelling, &c.

An accessible height is taken from one station; but an inaccessible height or distance is only to be taken by making two stations, from two places whose distance asunder is known. In making maps of counties, provinces, &c. stations are fixed upon certain eminencies, &c. of the country, and angles taken from thence to the several towns, villages, &c. In surveying, the instrument is to be adjusted by the needle, or otherwise, to answer the points of the horizon at every station; the distance from hence to the last station is to be measured, and an angle is to be taken to the next station; which process repeated includes the chief practice of surveying.

To STA'TION. *v. a.* (from the noun.) To place in a certain post, rank, or place.

STA'TIONARY. *a.* (from *station.*) 1. Fixed; not progressive (*Newton*). 2. Respecting place (*Brown*). 3. Belonging to a stationer.

STA'TIONER. *s.* (from *station.*) 1. A bookseller (*Dryden*). 2. A seller of paper.

STATIRA, daughter of Darius Codomanus, taken by Alexander the Great, who married her. She was cruelly put to death by Roxana, after the conqueror's death.

STA'TIST. *s.* (from *state.*) A statesman; a politician (*Milton*).

STATISTICS, a modern term adopted to express a more comprehensive view of the various particulars constituting the natural and political strength and resources of a country than was usually embraced by writers on political arithmetic. Its principal objects are, the extent and population of a state; the occupation of the different classes of its inhabitants; the progress of agriculture, of manufactures, and of internal and foreign trade; the income and wealth of the inhabitants, and the proportion drawn from them for the public service by taxation; the condition of the poor; the state of schools, and other institutions of public utility; with every other subject, the knowledge of which tends to establish the true civil policy of the country, and consequently to promote its prosperity.

The great change which has taken place in the business of government, since the introduction of the modern system of warfare, by which the time and labour of a considerable number of persons is wholly appropriated to the profession of arms; and, particularly, since the adoption of the borrowing system for defraying the expences of war, has rendered statistical information of much more importance than formerly; the naval and military force which a country is capable of furnishing depending essentially on the state of population and employment, and the public finances becoming, by a continual accumulation of taxes, intimately connected with the state of agriculture, consumption, and foreign trade. Many errors and inconsistencies of former statesmen and legislators might have been avoided by a better knowledge of the state of the country; yet, although the utility of cultivating this branch of knowledge has become so obvious, few of the governments of Europe have appeared much disposed to promote statistical inquiries. It will be a subject of wonder to future times, that even in Great Britain, so late as the year 1800, the state of the population, on which its capability of defence so much depended, was a subject of so much uncertainty, as to be estimated by many persons at but little more than half what it was afterward ascertained to be.

As a comparison of such statistical accounts as have been published of the different states of Europe would be in a great degree useless and unsatisfactory, since the violent and essential alterations most of them have recently undergone, we shall confine ourselves to the principal particulars relative to Great Britain, as deduced from public documents, and other authentic sources.

The island of Great Britain is about 590 miles in length, and the circuit of its coast makes about 1800 miles: the part constituting England and Wales is in length, from Newhaven, in Sussex, to Berwick upon Tweed, 355 miles, and in breadth, from the South Foreland, in Kent, to the Land's End, in Cornwall, 325 miles.

The area of England and Wales, computed in acres, has been very differently stated by different authors; for as it has never been ascertained by an actual survey, various modes of computation have been adopted, which have disagreed materially in the result. The following are the principal estimates on this point.

	Acres.
By Sir William Petty	28,000,000
Dr. Grew	46,000,000
Dr. Halley	39,938,500
Templeman	31,648,000
Arthur Young	46,916,000
Rev. H. Beeke	38,498,572

In the returns relative to the poor, laid before the House of Commons in 1804, it was stated, that by the best computation England and Wales contained 58,335 square statute miles, and 37,334,400 statute acres. Scotland, with its islands, contains about 21,000,000 of acres.

The soil of South Britain is annually cropped nearly in the following proportions.

	Acres.
Wheat	3,080,000
Barley and rye	850,000
Oats and beans	2,800,000
Clover, rye-grass, &c.	1,120,000
Turnips, carrots, cabbages, &c.	1,120,000
Fallow	2,100,000
	11,070,000

	Acres.
Brought over	11,070,000
Hop grounds	35,000
Nursery grounds	8,500
Fruit and kitchen gardens	45,000
Pleasure grounds	16,000
Land depastured by cattle	17,000,000
Hedge-rows, copses, and woods	1,600,000
Ways, water, &c.	1,282,100
Cultivated land	31,056,600
Commons and waste	6,277,800
	37,334,400

The number of horses for which duty is paid is 1,780,000. Their annual consumption of food, reckoned by the produce of acres, is

	Acres each.	Acres.
200,000 pleasure horses	5	1,000,000
30,000 cavalry	5	150,000
1,200,000 husbandry	4	4,800,000
350,000 colts, mares, &c.	3	1,050,000
		7,000,000

The total population of Great Britain, as it appeared by the returns made in 1801, including the army, navy, and merchant seamen, was 10,942,646; to which, if the islands of Guernsey, Jersey, Alderney, and the Scilly islands, are added, it may be taken at 11,000,000. Since which there has been an increase of more than a million and a half. See POPULATION. But it is evident, that the welfare of a nation, and its political strength, do not depend so much on its numerical population, as on the manner in which that population is employed; the proportion of productive to unproductive labourers of which it consists. No accurate account of this kind has ever been taken, but the following estimate of the different classes of persons who compose the present population of Great Britain cannot be far from the truth.

Nobility and gentry	5,000
Clergy of the churches of England and Scotland	18,000
Ditto dissenters of every description	14,000
Army and militia, including half-pay, &c.	240,000
Navy and marines	130,000
Seamen in the merchant service	155,000
Lightermen, watermen, &c.	3,500
Persons employed in collecting the public revenue	6,000
Judges, counsel, attornies, &c.	14,000
Merchants, brokers, factors, &c.	25,000
Clerks to ditto, and to commercial companies	40,000
Employed in the different manufactures	1,680,000
Mechanics not immediately belonging to ditto	50,000
Shopkeepers	160,000
Schoolmasters and mistresses	20,000
Artists	5,000
Players, musicians, &c.	4,000
Employed in agriculture	2,000,000
	4,569,500

Brought over	4,569,500
Male and female servants	800,000
Gamblers, swindlers, thieves, prostitutes, &c.	150,000
Convicts and prisoners	10,000
Aged and infirm	293,000
Wives and daughters of most of the above	2,427,500
Children under ten years of age	2,750,000
	11,000,000

If these different classes are divided according to the effect produced by their occupations, it will be found that the whole population of the country depends for subsistence, and all the conveniences of life, on the labour of less than one half of the total number; and the increase or decrease of this productive part of the community, and of the effect of their exertions, is the measure of the increase or decline of that gradual accumulation of stock which constitutes national wealth. In a different state of society, however, this division of the population would vary considerably; for were not those, who are considered as unproductive labourers, employed in their several vocations, their duties, or at least the principal of them, must be divided among those who at present are the efficient labourers; who, thus being obliged to give up part of their time to unproductive purposes, could not perform the same quantity of useful labour as at present; and consequently, to support the same population, a greater number of persons would be compelled to engage, at least partially, in productive employs.

The total income of all classes of the community, both as arising from capital and labour, appears to be nearly as follows:

	£
From rent of lands	29,000,000
From rent of houses	8,500,000
Profits of farming, or occupation of land	6,120,000
Income of labourers in agriculture	15,000,000
Profits of mines, canals, collieries, &c.	2,000,000
Profits of merchant shipping and small craft	1,000,000
Income of stockholders	20,500,000
From mortgages and other monies lent	3,000,000
Profits of foreign trade	11,250,000
Profits of manufactures	14,100,000
Pay of army, navy, and merchant seamen	5,000,000
Income of the clergy of all descriptions	2,200,000
Judges and all subordinate officers of the law	1,800,000
Professors, schoolmasters, tutors, &c.	600,000
Retail trades not immediately connected with foreign trade or manufactures	8,000,000
Various other professions and employments	2,000,000
Male and female servants	2,400,000
	£ 132,470,000

If this statement, the total of which is corroborated by the produce of the income or property tax, is not far from the truth, it will not be difficult to form a similar estimate of the total national capital, viz.

	£
Value of the land, at 28 years purchase	812,000,000
Value of houses, at 20 years purchase	170,000,000
Manufactories, machinery, steam engines, &c.	20,000,000
Household furniture	42,500,000
Apparel, provisions, fuel, wine, plate, watches, and jewels; books, carriages, and other articles	40,000,000
Cattle of all kinds	90,000,000
Grain of all kinds	10,600,000
Hay, straw, &c.	6,600,000
Implements of husbandry	2,000,000
	£ 1,193,700,000

	£
Brought over	1,193,700,000
Merchant shipping	12,800,000
The navy	6,000,000
Coin and bullion	24,000,000
Goods in the hands of merchants, &c.	16,300,000
Goods in the hands of manufacturers, and retail traders	20,000,000
	£ 1,272,800,000

In the year 1795, Mr. Pitt estimated the total landed property at 750 millions, and personal property at 600 millions, making a total of 1350 millions. But even from the above more moderate statement, in which most of the articles are probably taken rather below than above the truth, it appears that, notwithstanding all the new wants which refinement and fashion have introduced into the general mode of living, and the expensive wars in which the country has been engaged, there has usually been a surplus of the general revenue, which by gradual accumulation has raised the value of the national stock, or capital, to an amount far exceeding any rational estimate of it at former periods.

It is evident that this statement exhibits only the real or effective wealth of the country, upon which all other species of wealth, whether consisting in government or private securities, or of any other description, ultimately depend; for private or public loans, in which mode a great part of the property of many persons is invested, are obligations on the part of the borrowers to repay, at a future time, a certain sum in money, which is the measure and representative of all other species of real property, or to pay an income arising from this sum till the capital is repaid. The borrower is no otherwise richer than by the greater income he can make of the money borrowed, than what he agrees to pay for it, as the capital, whether he invests it in land, merchandize, or any other way, remains the property of the lender, who though he may not by the laws of the country be permitted to take possession of the property into which his money has been converted, may, if necessary, bring it to sale for the purpose of reconverting it into the equivalent sum which he had lent. If, therefore, the whole national stock was in the hands of one half of the inhabitants, who had borrowed the sum of 1,272,800,000*l.* of the other half, it is evident that it would be the real property not of those in possession, but of those to whom they were indebted, and this is actually the case with respect to a considerable part of the property of this country; the debts of government having contributed materially to produce this effect. (*Brit. Ency.*)

STATIUS (Publius Papinius), a Roman poet, born at Naples, in the reign of Domitian. He kept a school of rhetoric and oratory at Rome, with great reputation. He was in high favour with Domitian, being admitted to sit at his table among his chief ministers. He died about A. D. 100. The best editions of Statius are that of the Variorum L. Bat. 8vo. 1671; and that of Warrington, 2 vols. 12mo. 1778. For an account of the different editions of such works of Statius as have been published separately, see Dr. Clarke's very valuable Bibliographical Dictionary, vol. vi.

STATUARY, a branch of sculpture, said to be the invention of Dædalus, amidst other productions of ingenious talents: others assert him to have been only the improver of an art known long before his time, and that he was the first who endeavoured to give the appearance of motion and action to figures.

The Phenicians are said to have been the first who erected statues in honour of their gods; but, if we believe the accounts generally given of the Phenician worship, the religious statuary of that nation did not exhibit human forms, but merely pointed stones or other symbolical expressions of their divinities.

STATUES, are figures, representing living or deceased creatures, of whatever species, real or imaginary; and carved, cast, modelled, or moulded, in full relievo, insulated on every part.

Statues are formed with the chisel, of several materials, such as marble, stone, &c.: they are carved in wood; or cast in plaster of Paris, or other matter of the same nature; they are also cast in several metals, as lead, brass, silver, and gold.

Statues are divided into

Colossal, or considerably exceeding the dimensions of nature; as, for instance, the celebrated statue of Apollo, at Rhodes.

Allegorical, or such as, under human or other symbolical forms, represent subjects of a different kind, as Time, Ocean, Winds, or qualities of an intellectual nature, as Mercy, Justice, &c. &c.

Statues of deities, demi-gods, and heroes were, among the ancients, generally represented somewhat larger than life.

Monumental, either representing the person, the virtues, or the actions of the deceased.

Equestrian, generally of some illustrious person on horseback.

Pedestrian; or on foot.

The most celebrated statues are those of the Egyptians, Grecians, and Romans. Of the Egyptian statues, sufficient has been said under the article sculpture. See SCULPTURE. Of the Grecian and Roman we propose to add some important particulars.

STATUES (Antique). The denomination of antique statues is applicable to all ancient statues, found either in India, Egypt, &c. but is especially given, in preference, to the statues wrought by the ancient Greek and Roman sculptors. The works of the Grecians are considered as the most perfect examples of sculpture. Their statues are eminently admirable for the various beauty of their forms, for characteristic expression and grace. See SCULPTURE.

The Grecian statues of men are generally naked. The Roman are clothed agreeably to the manner of the country, and are distinguished into

Palludatæ (statuæ), those of emperors with long robes over their armour.

Loricatæ, those of soldiers with cuirasses.

Thoracatæ, those with coats of armour.

Togatæ, those of magistrates with the toga, or robe worn in office.

Trabeatæ, those of senators and augurs.

Tunicatæ, those clothed with a plain tunic.

Stolatæ, those of women with long trains.

The antique statues are most particularly remarkable for their systematic representation of the human form. As the principle most apparent in their system is that of proportions, we shall give, first, an account of their general proportions to which they chiefly adhered, and next, an accurate measurement of the various parts of the body, taken at Rome, from some of their most celebrated original statues.

It is to be observed, however, that although the inferior antique possesses little other merit than that of proportion, the excellence of the finer works of Greece is of a much more comprehensive description.

Proportions of the antique statues.—Proportion is the basis of beauty, and there can be no beauty without it; on the contrary, proportion may exist where there is little beauty. Experience teaches us, that knowledge is distinct from taste; and proportion, therefore, which is founded on knowledge, may be strictly observed in any figure, and yet the figure have no pretensions to beauty. The ancients considering ideal beauty as the most perfect, have frequently employed it in preference to the beauty of nature.

It is probable that the Grecian, as well as the Egyptian artists, determined the great and small proportions by fixed rules; that they established a positive measure for the dimensions of length, breadth, and circumference. This supposition alone can enable us to account for the great conformity which we meet with in ancient statues. Winkelman thinks that the foot was the measure which the ancients used in all their great dimensions, and that it was by the length of it that they regulated the measure of their figures by giving to them six times that length. This, in fact, is the length which Vitruvius assigns, L. 3. cap. 1. That celebrated architect thinks the foot is a more determinate measure than the head or the face, the parts from which modern painters and sculptors often take their proportions. This proportion of the foot to the body, which has appeared strange and incomprehensible to the learned Huetius, and has been entirely rejected by Perrault, is, however, founded upon experience. After measuring with great care a vast number of figures, Winkelman found this proportion not only in Egyptian statues, but also in those of Greece. This fact may be determined by an inspection of those statues, the feet of which are perfect; and one may be more fully convinced of it by examining some figures of the Greek divinities, in which the artists have made some parts beyond their natural dimensions. In the Apollo Belvedere, which is a little more than seven heads high, the foot is three Roman inches longer than the head. The head of the Venus de Medicis is very small, and the height of the statue is seven heads and a half; the foot is three inches and a half longer than the head, or precisely the sixth part of the length of the whole statue.

Other writers are of opinion, that the following rules form a principal part of the system of Grecian sculpture.

The body consists of three parts, as well as the members. The three parts of the body are, the trunk, the thighs, and the legs. The inferior part of the body are the thighs, the legs, and the feet. The arms also consist of three parts. These three parts must bear a certain proportion to the whole, as well as to one another. In a well formed man, the head and body must be proportioned to the thighs, the legs, and the feet, in the same manner as the thighs are proportioned to the legs and the feet, or the arms to the hands. The face also consists of three parts, that is, three times the length of the nose; but the head is not four times the length of the nose, as some writers have asserted. From the place where the hair begins to the crown of the head, are only three-fourths of the length of the nose, or that part is to the nose as 9 to 12. See SCULPTURE.

To STA'TUE. *v. a.* (from the noun.) To place as a statue (*Shakspeare*).

STATUMINATÆ. (from *statumen*, a prop or support, as the stakes put to vines, &c. from *statuo*.) The name of the sixty-first order in Linnéus's Fragments of a Natural Method, in Philosophia Botanica; containing only ulmus, celtis, bosea.

STA'TURE. *s.* (*statura*, Lat.) The height of any animal (*Brown*).

STA'TUTABLE. *a.* (from *statute*.) According to statute (*Addison*).

STA'TUTABLY. *ad.* (from *statutable*.) In a manner agreeable to law.

STATUTE, is a written law, made with the concurrence of the king and both houses of parliament. Divers acts of parliament have attempted to bar, restrain, suspend, qualify, or make void the acts of subsequent parliaments: but this could never be effected, for a latter parliament hath ever power to abrogate, suspend, qualify, or make void the acts of a former, in the whole, or any part thereof, notwithstanding any words of restraint or prohibition in the acts of the former.

When a statute is repealed, all acts done under it, while it was in force, are good; but if it is declared null, all those are void. Where a statute, before perpetual, is continued by an affirmative statute for a time, this does not amount to a repeal of it at the end of that time. When two acts contradictory to each other are passed in the same session, the latter only shall take effect. Formerly acts of parliament took effect from the beginning of the session: by a recent statute they have effect from the day on which they are passed. See LAW and PARLIAMENT.

STAVANGER, a seaport in Norway, in the province of Bergen, capital of a territory of the same name, with a bishop's see. It is seated on a peninsula, near the fortress of Doswick, 75 miles S. of Bergen. Lon. 5. 45 E. Lat. 59. 6 N.

To STAVE. *v. a.* (from *staff.*) 1. To break in pieces (*Dryden*). 2. To push away as with a staff (*Ben Jonson*). 3. To pour out by breaking the cask (*Sandys*). 4. To furnish with rundles or staves (*Knolles*).

To STAVE. *v. n.* To fight with staves (*Hudibras*).

To STAVE AND TAIL. *v. a.* To part dogs by interposing a staff, and by pulling the tail.

STAVEREN, an ancient seaport of the United Provinces, in Friesland, formerly a considerable town, but now much decayed, the harbour being choaked up with sand. It is seated on the Zuider-Zee, eight miles W. of Slooten, and 15 N.E. of Enchuysen. Lon. 5. 13 E. Lat. 52. 54 N.

STAVES. The plural of *staff*.

STAVE'S ACRE. See DELPHINIUM.

STAUBBACH, a celebrated cataract of Swisserland, near the village of Lauterbrunn, in the canton of Bern. It rushes down a precipice 930 feet high with such impetuosity, as to resolve itself into a fine spray, which, viewed in some particular situations, resembles a cloud of dust. Hence it derives its name: the word Staubbach, in German, signifying a spring of dust. The roaring noise it makes is accompanied by a tempest, occasioned by the violent agitation of the air, excited by the rapidity of the fall. The brook which forms this torrent is named the Kupfer-Bachlein, or Rivulet of Copper.

STAUFFEN, a town of Austrian Suabia, in the Brisgau, situate on the Mehlbach, eight miles S. of Friburg, and 24 N.N.E. of Basle. Lon. 7. 44 E. Lat. 48. 55 N.

STAUROLITE, in mineralogy, a stone composed chiefly of silex, the granatite of Saussure and Werner, and staurotide of Haüy. It has been found at Andreasberg in the Hartz. It is crystallized, and the form of its crystals has induced mineralogists to give it the name of cross-stone. Its crystals are two four-sided flattened prisms, terminated by four-sided pyramids, intersecting each other at right angles; the plane of intersection passing longitudinally through the prism. Sometimes these prisms occur solitary. Primitive form an octahedron, with isosceles triangular faces. The faces of the crystals striated longitudinally. Its texture is foliated. Its lustre glassy. Brittle. Specific gravity 2.33 to 2.36. Colour milk-white. When heated slowly it loses 0.15 or 0.16 parts of its weight, and falls into powder. It effervesces with borax and microcosmic salt, and is reduced to a greenish opake mass. With soda it melts into a frothy white enamel. When its powder is thrown on a hot coal, it emits a greenish-yellow light.

A specimen analysed by Westrum was composed of

44	silica
20	alumina
20	barytes
16	water
100	

Klaproth found the same ingredients, and nearly in the same proportions.

A variety of staurolite has been found only once, which has the following properties:

Its lustre is pearly, 2. Specific gravity 2.361. Colour brownish-grey. With soda it melts into a purplish and yellowish frothy enamel. It is composed, according to Westrum, of

47.5	silica
12.0	alumina
20.0	barytes
16.0	water
4.5	oxyds of iron and manganese
100.0	

Staurolite has also been found in St. Gothard in Switzerland, in small crystals, imbedded in micaceous schistus, and accompanied with cyanite; in Brittany, near Quimper, in middling sized crystals, imbedded in micaceous clay, apparently produced by the decomposition of some primitive rock; also at St. Jago of Compostella in a primitive rock.

STAVROPOL, a town of Russia, in the government of Simbirsk, situate on the Volga, 42 miles S.S.E. of Simbirsk. Lon. 28. 58 E. Lat. 53. 44 N.

STAVROPOL, a town of Russia, in the government of Caucasus, situate on the Volga. Lon. 41. 50 E. Lat. 44. 56 N.

STAUROTIDE. See STAUROLITE.

To STAY. *v. n.* (*staen*, Dutch.) 1. To continue in a place; to forbear departure (*Shakspeare*). 2. To continue in a state (*Dryden*). 3. To wait; to attend (*Locke*). 4. To stop; to stand still (*Bacon*). 5. To dwell; to be long (*Dryden*). 6. To rest confidently (*Isaiah*).

To STAY. *v. a.* 1. To stop; to withhold; to repress (*Raleigh*). 2. To delay; to obstruct; to hinder from progression (*Spenser*). 3. To keep from departure (*Dryden*). 4. (*estayer*, French.) To prop; to support; to hold up (*Hooker*).

STAY. *s.* (*estaye*, Fr.) 1. Continuance in a place; forbearance of departure (*Bacon*). 2. Stand; cessation of progression (*Hayward*). 3. A stop; an obstruction; a hinderance from progress (*Fairfax*). 4. Restraint; prudence; caution (*Bacon*). 5. A fixed state (*Donne*).

6. A prop; a support (*Milton*). 7. Tackling (*Pope*). 8. Steadiness of conduct.

STAY, in the sea-language, a strong rope fastened to the top of one mast, and on the foot of that next before it, towards the prow, serving to keep it firm, and prevent its falling afterwards or towards the poop. All masts, top-masts, and flag-staves, have their stays, except the sprit-sail top-masts. That of the main-mast is called the main-stay. The main-mast, fore-mast, and those belonging to them, have also back-stays to prevent their pitching forwards or overboard.

STAY-SAIL, a sort of triangular sail extended upon a stay.

STA'YED. *part. a.* (from *stay.*) Fixed; settled; serious; not volatile (*Bacon*).

STA'YEDLY. *ad.* (from *stayed.*) Composedly; gravely; prudently; soberly.

STA'YEDNESS. *s.* (from *stayed.*) 1. Solidity; weight (*Camden*). 2. Composure; prudence; gravity; judiciousness.

STA'YER. *s.* (from *stay.*) One who stops, holds, or supports (*Philips*).

STA'YLACE. *s.* (*stay* and *lace.*) A lace with which women fasten their bodice (*Swift*).

STAYS. *s.* Without singular. 1. Bodice; a kind of stiff waistcoat worn by women (*Gay*). 2. Ropes in a ship to keep the mast from falling aft (*Harris*). 3. Station; fixed anchorage (*Sidney*). 4. Any support; any thing that keeps another extended (*Dryden*).

STEAD. *s.* (ꞅꞇeꝺ, Sax.) 1. Place: obsolete (*Spenser*). 2. Room; place which another had or might have (*Hooker*). 3. Use; help (*Atterbury*). 4. The frame of a bed (*Dryden*).

STEAD, STED, being in the name of a place that is distant from any river, comes from the Saxon, ꞅꞇeꝺ, ꞅꞇẏꝺ, a place; but if it be upon a river or harbour, it is to be derived from ꞅꞇaðe, a shore or station for ships (*Gibson*).

To STEAD. *v. a.* (from the noun.) 1. To help; to advantage; to support; to assist (*Rowe*). 2. To fill the place of another (*Shakspeare*).

STEA'DFAST. *a.* (*stead* and *fast.*) 1. Fast in place; firm; fixed (*Spenser*). 2. Constant; resolute (*Ecclus.*). 3. Not turned aside by fear (*Dryden*).

STEA'DFASTLY. *ad.* Firmly; constantly.

STEA'DFASTNESS. *s.* (from *steadfast.*) 1. Immutability; fixedness (*Spenser*). 2. Firmness; constancy; resolution.

STEA'DILY. *ad.* (from *steady.*) 1. Without tottering; without shaking (*South*). 2. Without variation or irregularity (*Blackmore*).

STEA'DINESS. *s.* (from *steady.*) 1. State of being not tottering nor easily shaken. 2. Firmness; constancy (*Arbuthnot*). 3. Consistent unvaried conduct (*Collier*).

STEA'DY. *a.* (ꞅꞇeꝺıᵹ, Sax.) 1. Firm; fixed; not tottering (*Pope*). 2. Regular; constant (*Milton*). 3. Not wavering; not fickle; not changeable with regard to resolution or attention (*Locke*).

STEAK. *s.* (*styck*, Islandic, a piece.) A slice of flesh broiled or fried; a collop (*Swift*).

To STEAL. *v. n.* preterit *I stole*; part. pass. *stolen.* (ꞅꞇelan, Sax. *stelen*, Dutch.) 1. To take by theft; to take clandestinely; to take secretly without right (*Shakspeare*). 2. To withdraw or convey without notice (*Spenser*). 3. To gain or effect by private and gradual means (*Calamy*).

To STEAL. *v. n.* 1. To withdraw privily; to pass silently (*Shakspeare*). 2. To practise theft; to play the thief (*Shakspeare*).

STEA'LER. *s.* (from *steal.*) One who steals; a thief (*Shakspeare*).

STEA'LINGLY. *ad.* (from *stealing.*) Slily; by invisible motion; by secret practice (*Sidney*).

STEALTH. *s.* (from *steal.*) 1. The act of stealing; theft (*Shakspeare*). 2. The thing stolen (*Raleigh*). 3. Secret act; clandestine practice (*Dryden*).

STEA'LTHY. *a.* (from *stealth.*) Done clandestinely; performed by stealth (*Shakspeare*).

To STEAM. *v. n.* (ꞅꞇeman, Sax.) 1. To smoke or vapour with moist heat (*Philips*). 2. To send up vapours (*Milton*). 3. To pass in vapours (*Boyle*).

STEAM, is the name given in our language to the visible moist vapour which arises from all bodies which contain juices easily expelled from them by heats not sufficient for their combustion. Thus we say, the steam of boiling-water, of malt, of a tan-bed, &c. It is distinguished from smoke by its not having been produced by combustion, by not containing any soot, and by its being condensed by cold into water, oil, inflammable spirits, or liquids composed of these.

We see it rise in great abundance from bodies when they are heated, forming a white cloud, which diffuses itself and disappears at no very great distance from the body from which it was produced. In this case the surrounding air is found loaded with the water or other juices which seem to have produced it, and the steam seems to be completely soluble in air, as salt is in water, composing while thus united a transparent elastic fluid.

But in order to its appearance in the form of an opaque white cloud, the mixture with or dissemination in air seem absolutely necessary. If a tea-kettle boils violently, so that the steam is formed at the spout in great abundance, it may be observed, that the visible cloud is not formed at the very mouth of the spout, but at a small distance before it, and that the vapour is perfectly transparent at its first emission. This is rendered still more evident by fitting to the spout of the tea-kettle a glass pipe of any length, and of as large a diameter as we please. The steam is produced as copiously as without this pipe, but the vapour is transparent through the whole length of the pipe. Nay, if this pipe communicate with a glass vessel terminating in another pipe, and if the vessel be kept sufficiently hot, the steam will be as abundantly produced at the mouth of this second pipe as before, and the vessel will be quite transparent. The visibility therefore of the matter which constitutes the steam is an accidental or extraneous circumstance, and requires the admixture with air; yet this quality again leaves it when united with air by solution. It appears therefore to require a dissemination in the air.

The appearances are quite agreeable to this notion: for we know that one perfectly transparent body, when minutely divided and diffused among the parts of another transparent body, but not dissolved in it, makes a mass which is visible. Thus oil beat up with water makes a white opaque mass.

In the mean time, as steam is produced, the water gradually wastes in the tea-kettle, and will soon be totally expended, if we continue it on the fire. It is reasonable therefore to suppose, that this steam is nothing but water changed by heat into an aërial or elastic form. If so, we should expect that the privation of this heat would leave it in the form of water again. Accordingly this is fully verified by experiment; for if the pipe fitted to the spout of the tea-kettle be surrounded with cold water, no steam will issue, but water will continually trickle from it in drops; and if the process be conducted with the proper precautions, the water which we thus obtain from the pipe will be found equal in quantity to that which disappears from the tea-kettle.

Steam, and especially that which is raised from the volatilization of hot water, is employed as a first mover in that admirable contrivance the steam engine. This steam when raised with the ordinary heat of boiling water is almost 3000 times rarer than water, or more than 3½ times rarer than air, and then has its elasticity equal to that of the common atmospheric air: by great heat it has been found that the steam may be expanded into 14000 times the space of water, and then exerts a force of nearly five times the pressure of the atmosphere: and there is no reason to suppose this is the limit; indeed some accidents which have happened prove clearly that the elastic force of steam may at least equal that of gunpowder.

The observations on the different degrees of temperature acquired by water in boiling, under different pressures of the atmosphere, and the formation of the vapour from water under the receiver of an air-pump, when with the common temperatures the pressure is diminished to a certain degree, shew clearly that the expansive force of vapour or steam is different in the different temperatures, and that in general it increases, in a variable ratio, as the temperature is raised. Previous to describing the method which has been adopted to measure the force of steam under different temperatures, it will be proper to describe briefly the method by which the chemists account for the production of aeriform fluids.

The term caloric may be used to denote the cause, whatever it may be, of heat, and of the phenomena which accompany heat: it is now admitted to be a highly elastic fluid. Every body is, according to its nature, capable of containing under a given volume a certain quantity of caloric, either greater or less: this property was first observed by Dr. Black, and the English chemists designated it by the term *capacity of a body to contain the matter of heat.* Professor Wilcke and M. Lavoisier first made use of the term *specific caloric*, denoting by it the quantity of caloric respectively necessary to elevate to the same number of degrees the temperature of several bodies of equal weight.

Substances volatilized and reduced to gass or aeriform fluids are nothing else than ordinary solid or fluid bodies, which by some circumstance are found superabundantly combined with caloric, in such a manner, that the constituent particles of these bodies are separated the one from the other, by a quantity of ambient caloric, much more considerable than that which surrounds the same particles in the natural state of the bodies. The extreme elasticity of the caloric, the effect of which is augmented by its condensation, and the weakening of the reciprocal attraction or of the cohesion of the particles of the bodies (a weakening or diminution produced by the increased distance of those particles) concur to diminish the density of the bodies in such a manner that they become reduced to an aeriform state.

As to the elasticity of gasseous fluids thus formed, it appears in great measure to be produced by the elasticity of caloric itself, which, when bodies are reduced to the gasseous state, occupy a very great part of their volume. This eminent elasticity of caloric tends continually to produce expansion; on the other hand this fluid, by a particular destination of nature, is more or less disseminated between the moleculæ of all bodies, in such sort that we may say with M. Lavoisier, that even in the solid state these moleculæ do not touch, but, as it were, swim in the caloric at a certain distance from each other. There must therefore be a perpetual contest between the expansive force of caloric, which leads to disseminate the moleculæ, and the cohesive attraction of the moleculæ, which tends to join them together. From the reciprocal intensity of these two powers results the solid and liquid states of bodies: thus water only differs from ice by the greater or lesser condensation of caloric, which permits more or less of the moleculæ of the liquid to yield to the effect of their attraction or reciprocal cohesion.

When substances pass from the liquid to the aeriform state, there is a third power to combine with the expansive effort of caloric, and the aggregative or attractive efforts of the moleculæ; namely, the pressure of the atmosphere, or of any elastic fluid whatever which compresses the fluid, and opposes itself to the separation of its parts. This third power has a certain influence also upon the passage from the solid to the fluid state, but it is most frequently (in this case) very small, and even evanescent, in comparison of the resistance arising from the mutual cohesion of the moleculæ. The contrary effect has place in the course of the passage from the liquid to the gasseous or aeriform state; the cohesion of the fluid moleculæ being extremely small, the elasticity of the caloric has scarcely any thing to surmount to produce volatilization besides the pressure of the atmosphere, or gass which actually compasses it.

Hence it results, that the same liquid under different pressures ought to volatilize at different temperatures. M. Lavoisier proved the truth of this result, by placing ether under the receiver of an air-pump, and producing volatilization solely by taking off a part of the pressure of the atmosphere. See Chymie, tome I. p. 9. And we know by many experiments of M. Deluc and others, that water boils the more speedily as it is less pressed by the weight of the atmosphere.

Lavoisier notices a curious consequence of what has been here said; which is, that if our planet revolved upon its axis with such a velocity as to lessen the pressure of the atmosphere, or if the temperature of the air were raised, then several fluids which we now see under a liquid state would only exist in the aeriform state: for example, if under the temperature of summer, the pressure of the atmosphere were only equivalent to 20 or 24 inches of the barometrical tube, that pressure would not retain ether in the fluid state, it would be changed into gass: and the like would happen, if while the pressure of the air was equivalent to 20 or 30 inches of the mercury, the habitual temperature were 105 or 110 degrees on Fahrenheit's scale.

The principles which have been here exhibited are sufficient for the understanding of all which relates to the action of water, or other fluids reduced to vapour. And it has appeared from frequent experiments, that water heated in common air volatilizes at 80° of Reaumur's thermometer, or 212° of Fahrenheit's, the height of the barometer being 28 French, or 29.9 English inches: and spirits of wine under a like pressure, volatilizes at between 63° and 64° of Reaumur, or nearly 175° of Fahrenheit. The expansive force of the vapour must, therefore, in both these cases, according to the principles just explained, be measured by a column of mercury of 28 French, or 29.9 English inches, in like manner, as such a column measures the pressure of the atmosphere, or the elasticity of common air. And at any more elevated temperatures, the elastic force of the vapour will surpass the pressure of the atmosphere by a quantity which has a certain relation with the excess of the temperature above those just stated.

Till lately, there was wanting on this important subject a series of exact and direct experiments, by means of which, having given the temperature of the heated fluid, the expansive force of the steam rising from it might be known, and *vicé versa*. There was likewise wanting an analytical theorem expressing the relation between the temperature of the heated fluid, and the pressure with which the force of the steam was in equilibrio. These desiderata have, however, been supplied by M. Bettancourt, an ingenious Spanish philosopher, in a manner for the detail of which we must refer to the treatise on first movers, in the 2d vol. of Gregory's Mechanics.

But our ingenious countryman Mr. Dalton, of Manchester, is of opinion that M. Bettancourt's deductions are not quite accurate. His chief error consists in having assumed the force of vapour from water of 32° (Fahrenheit) to be nothing; which makes his numbers essentially wrong at that point, and in all the lower parts of the scale: and in the higher part, or that which is above 212°, the force is determined too much; owing, as Mr. Dalton apprehends, to a quantity of air, which being disengaged from the water by heat and mixing with the steam, increases the elasticity.

Mr. Dalton's first experiments with spirit of wine led him to adopt the same conclusion as M. Bettancourt, with respect to the constant ratio between the force of the vapour from this spirit, and that from water; and inferred the same with regard to the vapour from other fluids. But, on pursuing the subject, he concluded that this principle was not true, either with respect to spirit of wine or any other liquid. His experiments upon six different liquids agree in establishing as a general law, "That the variation of the force of vapour from all liquids, is the same for the same variation of temperature, reckoning from vapour of any given force: thus assuming a force equal to thirty inches of mercury as the standard, it being the force of vapour from any liquid boiling in the open air, we find aqueous vapour loses half its force by a diminution of 30 degrees of temperature: so does the vapour of any other liquid lose half its force by diminishing its temperature 30 degrees below that in which it boils; and the like for any other increment or decrement of heat. This being the case, it becomes unnecessary to give distinct tables of the force of vapour from different liquids, as one and the same table is sufficient for all."

The experiments on which this conclusion rests are related in the 5th volume of the Manchester Memoirs: they may also be seen in the 6th volume of the New Series of Mr. Nicholson's Journal. Mr. Dalton has calculated a table of the force of vapour of water, from the temperature of 40° below zero of Fahrenheit, to 325° above it. From this table we have extracted the following; in which we have, for the greater convenience, reduced the force to the medium pressure of the atmosphere for the measuring unit.

Temperature on Fah.	Force of aqueous vapour.	Temperature on Fah.	Force of aqueous vapour.
80°	.0333	212°	1.000
90	.0453	220	1.166
100	.0620	230	1.391
110	.0843	240	1.655
120	.1110	250	1.940
130	.1446	260	2.257
140	.1913	270	2.595
150	.2473	280	2.958
160	.3153	290	3.337
170	.4043	300	3.727
180	.5050	310	4.117
190	.6333	315	4.309
200	.7880	320	4.500
210	.9613	325	4.690

Steam engine, an engine for raising water, or for producing any powerful effect in moving machinery, &c. by the force of steam obtained from boiling water. It is often called a fire engine, on account, perhaps, of the fire employed in heating the water, in order to throw off the steam. This is unquestionably one of the most useful, curious, and important machines that has ever been invented; and it is thought, that without the aid of this, or some other engine adapted to the same purpose, we should long ere this have been deprived of the benefit of coal fires; as our forefathers, full a century ago, had excavated almost all the mines of that substance as deep as they could be worked, without the aid of some engine to draw water from greater depths. The principle of this machine is as follows: there is a forcing pump with its rod fixed to one end of a lever, which is worked by the weight or pressure of the atmosphere upon a piston at the other end, a temporary vacuum being made below it, by suddenly condensing the steam, that had been let into the cylinder in which this piston works, by a jet of cold water thrown into it. A partial vacuum being thus made, the weight of the atmosphere presses down the piston, and raises the other end of the straight lever with water, &c. from the mine. Then immediately a hole is uncovered in the bottom of the cylinder, by which a fresh supply of hot steam rushes in from the boiler, which acts as a counterbalance for the atmosphere above the piston, and the weight of the pump rods at the other end of the lever carries that end down, and of course raises the piston of the steam cylinder. The orifice for the emission of the steam is immediately shut, and the cock opened for injecting the cold water into the cylinder: this condenses it to water, and another vacuum is made below the piston, which is now again forced down by the weight of the atmosphere, and thus the work is continued so long as water and fuel are supplied.

This is the common principle of the steam engine, but the methods of operation are very various: there is seldom a year that passes away, that we have not new patents obtained for improvements, or professed improvements, of this machine. It is comparatively of modern invention: the earliest account of any one is that in the marquis of Worcester's History of Inventions, published in the year 1663; the description here is too scanty to work upon, but it furnished the idea, which has afforded to ingenious men of all nations the opportunity of putting forth their skill and their talents, in executing a number of important improvements on the subject. Captain Savery was the first person who attempted to realize the noble marquis's project: he made the pressure of steam act immediately on the surface of water contained in a close vessel, and the water was forced, by the elasticity of the steam, to ascend through a pipe. The objection to this was the great heat required for raising water to any considerable height: and also the waste of steam by its coming in contact with the cold water in the receiver, the surfaces of which required to be heated to its own temperature, before the water could be expelled. These inconveniences were in a great measure avoided in Newcomen's engine, where the steam was gradually introduced into a cylinder, and suddenly condensed by a jet of water, so that the piston was forced down with great violence by the pressure of the atmosphere, which produced the effective stroke; this effect was, however, partly employed in raising a counterpoise, which descended upon the readmission of the steam, and worked a forcing pump in its return, when water was to be raised. Engines on this principle were commonly used in this country, till the improvements on them were introduced by Mr. Watt, to whom the public, in this business, is more indebted than to any other person. The engines constructed by this gentleman are said to save three-fourths of the fuel that was used in the best constructed engines of Newcomen, with the waste of only one fourth of the steam. He has contrived to preserve an uniform heat in the cylinder of his engines, by suffering no cold water to touch it, and by protecting it from the air, or other cold bodies, by a surrounding case filled with steam, or with hot air, or water, and by coating it over with substances that conduct the heat very slowly and imperfectly. He makes his vacuum to approach nearly in excellence to that of a barometer, by condensing the steam in a separate vessel, called the condenser, which may be cooled at pleasure, without cooling the cylinder, either by an injection of cold water, or by surrounding the condenser with it. He extracts the injection water, and detached air, from the cylinder, or condenser, by pumps, which are worked by the engine itself. As the entrance of air into the cylinder would stop, or very much impede, the operation of the engines, and as it is almost impossible to expect such pistons to be absolutely air-tight, a stream of water used to be kept running on the piston, to prevent the entry of the air, as the lighter fluid could not descend through the heavier: this mode, which was not injurious to the engines on the old construction, could not fail to injure the modern ones of Mr. Watt. He therefore makes his pistons more accurately; and the outer cylinder, having a lid, which covers it, the steam is introduced above the piston, and when a vacuum is produced under it, acts upon it by its elasticity, as the atmosphere does upon common engines by its gravity. This method of working effectually excludes the air from the inner cylinder, and gives the advantage of adding to the power, by increasing the elasticity of the steam. We shall endeavour to give our readers an idea of the manner in which Mr. Watt's engine works, and then present them with an accurate description.

The cylinder in Mr. Watt's engines is very accurately bored, and surrounded at a small distance with another cylinder furnished with a bottom and lid. The interval between the cylinders communicates with the boilers by a large pipe, open at both ends, so that it is always filled with steam, and thereby keeps the inner cylinder at the same temperature as that of the steam, and prevents any condensation. The inner cylinder has a bottom and piston as usual; and as it does not reach quite up to the lid of the outer cylinder, the steam in the interval has always free access to the upper side of the piston. The lid of the outer cylinder has a hole in its middle; and the piston rod, which is truly cylindrical, moves up and down through that hole, which is kept steam-tight by a collar of oakum skrewed down upon it. At the bottom of the inner cylinder there are two regulating valves, one of which admits the steam to pass from the interval into the inner cylinder below the piston, or shuts it out at pleasure: the other opens or shuts the end of a pipe, which leads to the condenser. The condenser consists of one or more pumps, furnished with clacks and buckets, which are worked by chains fastened to the great working beam of the engine. The pipe which comes from the cylinder is joined to the bottom of these pumps, and the whole condenser stands immersed in a cistern of cold water, supplied by the engine. The place of the cistern is either within the house or under the floor, between the cylinder and the lever wall; or without the house, between that wall and the engine shaft. The condenser being exhausted of air, and both cylinders filled with steam, the regulating valve which admits the steam into the inner cylinder is shut, and the other regulator which communicates with the condenser is opened, and the steam rushes into the vacuum of the condenser with violence: but there it comes into contact with the cold sides of the pumps and pipes, and meets a jet of cold water, which was opened at the same time with the exhaustion regulator: these instantly deprive it of its heat, and reduce it to water; and the vacuum remaining perfect, more steam continues to rush in, and is condensed till the inner cylinder is exhausted. Then the steam which is above the piston, ceasing to be counteracted by that which was below it, acts upon the piston with its whole elasticity, and forces it to descend to the bottom of the cylinder, and so raises the buckets of the pumps, which are hung to the other end of the beam. The exhaustion regulator is now shut, and the steam one opened again; which, by letting in the steam, allows the piston to be pulled up by the superior weight of the pump rods, and then the engine is ready for another stroke.

The peculiar advantages that result from this construction are, that the cylinder being surrounded with the steam from the boiler, is always kept uniformly as hot as the steam itself, and is, therefore, incapable of destroying any part of the steam which should fill it: and again, the condenser being kept always as cold as water can be procured, the steam is perfectly condensed, and does not oppose the descent of the piston; which is, therefore, forced down by the full power of the steam from the boiler, which is greater than that of the atmosphere.

Previously to Mr. Watt's inventions the steam-engine had been used principally, if not entirely, as a hydraulic machine for draining mines or for raising water: but in consequence of Mr. Watt's and other subsequent improvements, it has for a series of years been employed as the first mover of almost every species of machinery.

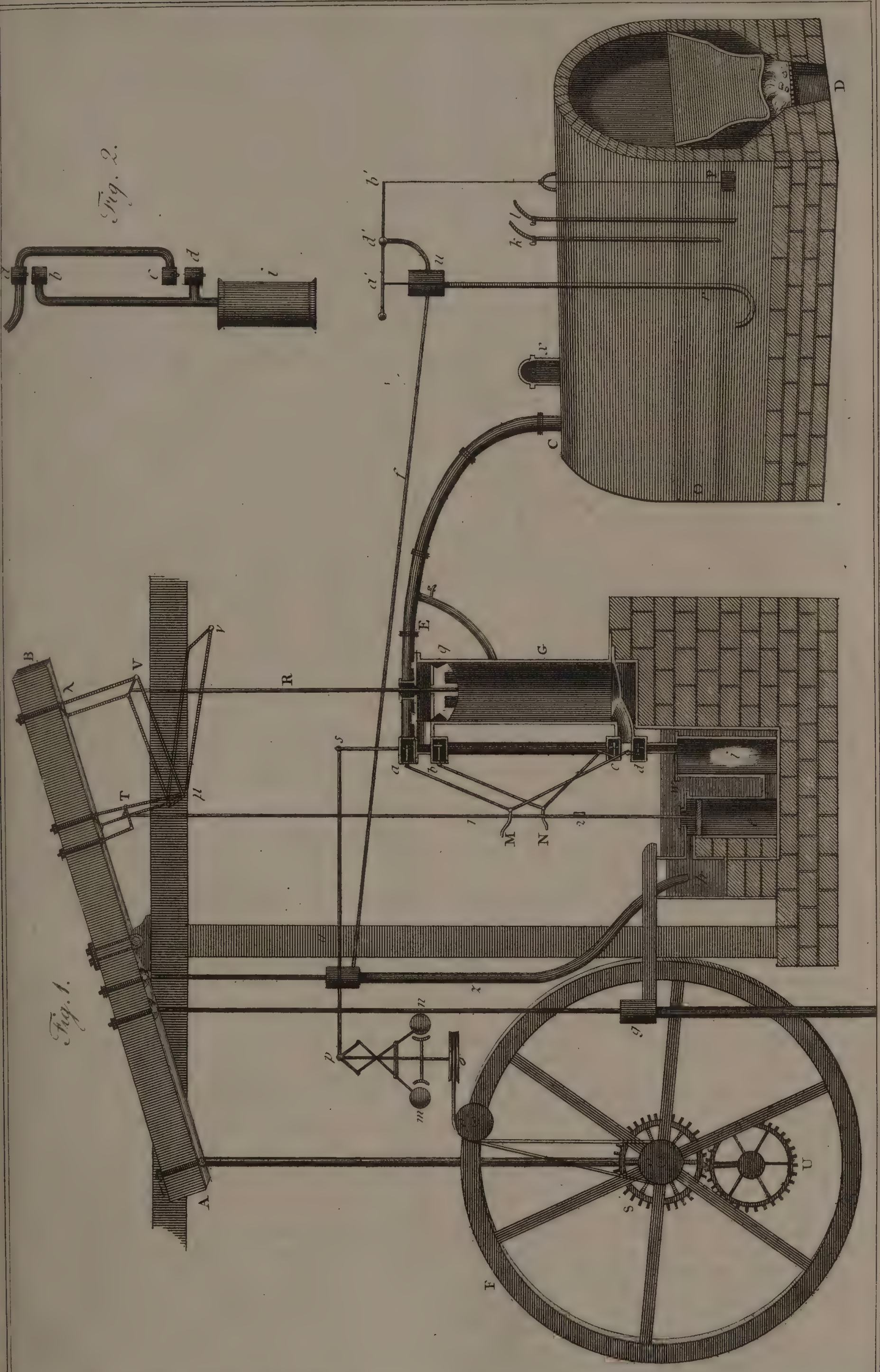
In the present improved state the mechanism is extremely curious, though as simple as can well be expected, considering its nature, power, and object. We shall here lay before the reader the description given by Dr. Brewster, in his edition of Ferguson's Lectures; being the most perspicuous and satisfactory account which we have met with in equal compass.

Plate 162, fig. 1. furnishes a general representation of one of thes eengines. CD is the boiler in which the water is converted into steam by the heat of the furnace D. It is sometimes made of copper, but more frequently of iron: its bottom is concave, and the flame is made to circulate round its sides, and is sometimes conducted by means of flues even through the middle of the water, so that as great a surface as possible may be exposed to the action of the fire. In some of Watt's engines the fire contained in an iron vessel was introduced into the middle of the water, and the outer boiler was formed of wood, as being a slow conductor of heat. When the furnaces are constructed in the most judicious manner, eight square feet of the boiler's surface must be acted upon by the fire or the flame, in order to convert one cubic foot of water into steam, in the space of an hour. When fire is applied to the boiler, the water is not converted into steam till it has reached the temperature of 212° of Fahrenheit, or the boiling point. And, indeed, when the water is pressed by air or steam, more condensed than the atmosphere, a temperature greater than 212° is necessary for the production of steam: but the heat requisite for this purpose increases in a less ratio than the pressure to be overcome. The steam which is produced in the boiler is about 1800 times rarer than water, and is conveyed through the steam pipe CE, into the cylinder G, where it acts upon the piston q, and communicates motion to the great beam AB. But before we trace the mode of transmitting this motion, we must describe the very ingenious method employed by Mr. Watt for supplying the boiler regularly with water, and preserving it at the same level OP; a circumstance which is absolutely necessary, that the quantity and elasticity of the steam in the boiler may be always the same. The small cistern u, placed above the boiler, is supplied with water from the hot well h, by means of the pump z, and the pipe f. To the bottom of this cistern is fitted the pipe ur, which is immersed in the water OP, and is bent at its lower extremity, in order to prevent the entrance of the rising steam. A crooked arm $u\,d'$, attached to the side of the cistern u, supports the small lever $a'\,b'$ which moves upon d' as a centre. The extremity b' of this lever carries, by means of the wire $b'\,P$, a stone or piece of metal P, which hangs just below the surface of the water in the boiler, and the other extremity a' is connected by the wire $a'u$ with a valve at the bottom of the cistern u, which covers the top of the pipe $u\,r$. Now, it is a maxim in hydrostatics, that when a heavy body is suspended in a fluid it loses as much of its weight as equals that of the quantity of fluid which it displaces. When the water OP, therefore, is diminished by the conversion of part of it into steam, the upper surface of the body P will be above the fluid, and its weight will consequently be increased, in proportion to the quantity of the body that is not immersed. By this addition to its weight the stone P will cause the extremity b' of the lever to descend, and, in consequence, by elevating the arm $d'a'$, will open the valve at the top of the pipe $u\,r$, and thus gradually introduce a quantity of water into the boiler, equal to that which was lost by evaporation. This process is continually going on, while the water is converting into steam: and it is evident, that too much water can never be introduced; for as soon as the surface of the water coincides with the surface of the body P, it recovers its former weight, and the valve at u shuts the top of the pipe $u\,r$.

In order to know the exact height of the water in the boiler, two cocks k and l are employed, the first of which reaches to within a little of the height at which the water would stand, and the other, l, reaches a very little below that height. If the water stands at the desired height, the cock k being opened, will give out steam, and the cock l will emit water, in consequence of the pressure of the superincumbent steam on the water OP: but if water should issue from both cocks, it will be too high in the boiler; and if steam issues from both, it will be too low.

As there would be great danger of the boiler's bursting if the steam should become too strong, it is furnished with the safety valve x, which is so loaded, that its weight, added to that of the atmosphere, may exceed the pressure of the interior steam, when of a sufficient strength. As soon as the expansive force so far increases as to become dangerous to the boiler, its pressure preponderates over the pressure of the atmosphere and the safety valve: the valve therefore opens, and the steam escapes from the boiler, till its strength is sufficiently diminished, and the safety valve shuts by the predominance of its pressure over that of the interior steam. By opening the safety valve the engine may be stopt at pleasure: and to effect this, a small rectangular lever, with equal arms, is fixed upon the side of the valve, and connected with its top; to one of these arms a chain is attached, which passes over a pulley, from a horizontal to a vertical direction, so that by pulling it the valve is opened, and the machine stopped.

From the dome of the boiler proceeds the steam-pipe CE, which conveys the steam into the top of the cylinder G by means of the steam-valve a, and into the bottom of the cylinder by means of the valve c. The branch of the pipe which extends from a to c is cut off in fig. 1. in order to show the valve b, but is distinctly visible in fig. 2, which is a view of the pipes and valves in the direction FM. The cylinder G is sometimes inclosed in a wooden case, in order to prevent it from being cooled by the ambient air; and sometimes in a metallic case, that it may be surrounded and kept warm by a quantity of steam which is brought from the



Mutlow, Sc. Russell Co.

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steam-pipe EC, through the pipe EG, by turning a cock. It is generally thought, however, that little benefit is obtained by encircling the cylinder with steam, as the quantity thus lost is almost equal to what is destroyed by the coldness of the cylinder. After the steam, which was admitted above the piston q by the valve a, and below it by the valve c, has performed its respective offices of depressing and elevating the piston, and consequently the great beam AB, it escapes by the eduction valves b and d, fig. 1 and 2, into the condenser i, where it is converted into water by means of a jet playing in the inside of it. The water thus collected in the condenser is carried off, along with the air which it contains, into the hot well h, by the air-pump e which is wrought by the piston rod TM, attached to the great beam AB. From the hot well h this water is conveyed by the pump z and the pipe f into the cistern u, for the purpose of supplying the boiler. The water w which renders air-tight the pump e, and supplies the jet of water in the condenser, is furnished by the pump g, which is worked by the great beam. The steam and eduction valves a, c, b, d, are opened and shut by the spanners $a\,M$, $d\,M$, $c\,N$, $b\,N$, whose handles M and N are moved by the plugs 1, 2, fixed to TN the piston rod of the air-pump. This part of the machinery has been called the working geer; and is so constructed that the steam and eduction valves can be worked, either by the hand or by the piston of the air-pump. The piston rod R, which moves the piston q, passes through a box or collar of leathers fixed in a strong metallic plate on the top of the cylinder. The rod is turned perfectly cylindrical, and is finely polished in order to prevent any air from passing by its sides. The top V of the piston rod R is fixed to the machinery TV, which is called the parallel joint, and is so contrived as to make the rod VR ascend and descend in a vertical or perpendicular direction. When the lever or beam rises into its present position from a horizontal one, the piston rod VR has a tendency to move towards μ, and would move towards it were the bar $\mu\,\nu$ fixed in its present position; for while the point V rises, the bar $\mu\,V$ also rises, at the same time the angle $V\,\mu\,\nu$ increases, and likewise the angle $\lambda\,V\,\mu$, so that the vertex V of the angle $\lambda\,V\,\mu$ would move towards T. The bar $\mu\,\nu$, however, is not at rest, but moves round the fixed point ν, and rises along with the point V; while $\mu\,\nu$, therefore, rises upon ν as a centre, the adjoining bar $\mu\,T$ moves round the point T towards V, the angle $T\,\mu\,\nu$ increases, and the point μ approaches to V, and keeps VR in a perpendicular position, so that whatever tendency the point V has towards T by the increase of the angle $\lambda\,V\,\mu$, it has an equal tendency in the contrary direction, by the increase of the angle $T\,\mu\,\nu$: but as the beam AB falls into a horizontal position, all these motions are reversed. When the piston rod VR rubs most upon the side of the collar of leathers nearest to a, the fixed point ν must be shifted a little in the contrary direction, viz. to the right hand of R. That the nature of this parallel joint may be better understood, it may be proper to observe, that all the bars which have been mentioned are double, as may be seen in the figure,—that they move round points at λ, T, V, μ, and ν, and that the two bars between μ and V move between the bars at $\mu\,\nu$.

In the steam engines of Newcomen and Beighton, where the piston was raised merely by a counterweight at the extremity A of the great beam, the piston rod was connected with its other extremity by means of a chain bending round the arch of a circle fixed at B; but in Mr. Watt's improved engines with a double stroke, in which the piston receives a strong impulse upwards as well as downwards, the chain would slacken, and could not communicate motion to the beam. An inflexible rod, therefore, must be employed for connecting the piston with the beam, or the piston must be suspended by double chains like those of engines for extinguishing fire. In some of Mr. Watt's engines the latter of these methods was adopted: he then employed a toothed rack working in a toothed sector fixed at B, and afterwards fell upon the very superior method which we have now been describing.

We have said that all the engines which were constructed before the time of Mr. Watt were employed merely for raising water, and were never used as the first movers of machinery. Mr. R. Fitzgerald, indeed, published in the Transactions of the Royal Society, a method of converting the irregular motion of the beam into a continued rotatory motion, by means of a crank and a train of wheel-work connected with a large and massy fly, which, by accumulating the pressure of the machine during the working stroke, urged round the machinery during the returning stroke, when there is no force pressing it forward. For this new and ingenious contrivance, Mr. Fitzgerald received a patent, and proposed to apply the steam engine as the moving power of every kind of machinery, but it does not appear that any mills were erected under this patent. In order to convert the reciprocating motion of the beam into a circular motion, Mr. Watt fixed a strong and inflexible rod AU to the extremity of the great beam. To the lower end of this rod, a toothed wheel U is fastened by bolts and straps, so that it cannot move round its axis. This wheel is connected with another toothed wheel S of the same size, by means of iron bars, which permits the former to revolve round the latter, but prevents them from quitting each other. This apparatus is called the sun and planet wheels, from the similarity of their motion to that of the two luminaries. On the axis of the wheel S is placed the large and heavy fly wheel F, which regulates the desultory motion of the beam. When the extremity A of the great beam rises from its lowest position, it will bring along with it the wheel U, and cause it to revolve upon the circumference of the wheel S, so that the interior part of the former, or the part next the cylinder, will act upon the exterior part of the latter, or the part farthest from the cylinder, and put it in motion along with the fly F. After the wheel U has got to the top of the wheel S, the end A of the beam will have reached its highest position, and the wheel S, along with the fly, will have performed one complete revolution. When the wheel U passes from the top of S into its former position below it, the extremity A of the beam will also descend from its highest to its lowest position, so that for every ascent or descent of the piston or the great beam, the planet wheel U will make one turn, while the sun wheel and fly will perform two complete revolutions.

When the steam engine is employed to drive machinery in which the resistance is very variable, and where a determinate velocity cannot properly be dispensed with, Mr. Watt has applied a conical pendulum, which is represented at *m n*, for procuring an uniform velocity. This regulator consists of two heavy balls *m n*, suspended by iron rods which move in joints at the top of the vertical axis *q p*, and is put in motion by the rope *o o* which passes over the pulleys *o*, *o*, and round the axis *o* of the fly. Since the velocity of the fly and sun wheel increases and diminishes with the quantity of steam that is admitted into the cylinder, let us suppose that too much is admitted,—then the velocity of the fly will increase, but the velocity of the vertical axis *o p* will also increase, and the balls *m n* will recede from the axis by the augmentation of their centrifugal force. By this recess of the balls, the extremity *p* of the lever *p s*, moving upon *y* as a centre, is depressed, its other extremity *s* rises, and by forcing the cock at *a* to close a little, diminishes the supply of steam. The impelling power being thus diminished, the velocity of the fly and the axis *o p* decreases in proportion, and the balls *m*, *n*, resume their former position.

In Mr. Watt's improved engine, the steam and eduction valves are all puppet clacks. One of these valves, and the method of opening and shutting it, is represented in fig. 1 of plate 162. Let it be one of the eduction valves, and let *AA* be part of the pipe which conducts the steam into the cylinder, and *MM* the superior part of the pipe which leads to the condenser. At *OO*, the seat of the valve, a metallic ring, of which *n n* is a section, is fitted accurately into the top of the pipe *MM*, and is conical on the outer edge, so as to suit the conical part of the pipe. These two pieces are ground together with emery, and adhere very firmly when the contiguous surfaces are oxydated or rusted. The clack is a circular brass plate *m*, with a conical edge ground into the inner edge of the ring *n n*, so as to be air-tight, and is furnished with a cylindrical tail *m P*, which can rise or fall in the cavity of the cross bar *NN*. To the top of the valve *m* a small metallic rack *m F* is firmly fastened, which can be raised or depressed by the portion *E* of a toothed wheel, moveable upon the centre *D*. The small circle *D* represents a section of an iron cylindrical axis, whose pivots move in holes in the opposite sides of the pipe *AA*. Its pivots are fitted into their sockets, so as to be air-tight; and the admission of air is farther prevented by screwing on the outside of the holes necks of leather soaked in rosin or melted tallow. One end of this axis reaches a good way without the pipe *AA*, and carries a handle or spanner *b N*, which may be seen in fig. 1, plate 162, and which is actuated by the plugs 1, 2, of the rod *TN*. When the plug 2, therefore, elevates the extremity of the spanner *N b*, during the ascent of the piston rod *TN*, the axle *D*, plate 165, fig. 1, is put in motion, the valve *m* is raised by means of the toothed racks *E* and *F*, and the steam rushes through the cavity of the circular ring *n n*, by the sides of the cross piece of metal *OO*, *NN*. When the valve needs repair, the cover *B*, which is fastened to the top of the valve box by means of screws, can easily be removed.

Having thus described the different parts of the most improved steam engine, it will be proper to attend to the mode of its operation. Let us suppose that the piston is at the top of the cylinder, as is represented in the figure, and that the upper steam valve *a*, and the lower eduction or condensing valve *d*, are opened by means of the spanner *M*, while the lower steam valve *c*, and the upper eduction valve *b*, are shut; then the steam in the boiler will issue through the steam pipe *CE*, and the valve *a*, into the top of the cylinder, and depress the piston, by its elasticity, to the very bottom. But when the piston *q* is brought to the bottom of the cylinder, the extremity *B* of the great beam is dragged down by the parallel joint *TV*, its other extremity *A* rises, and the wheel *u* having passed over half of the circumference of *S*, will have urged forward the fly-wheel *F*, and consequently, the machinery attached to it, one complete revolution. When the piston *q* has reached the bottom of the cylinder, the piston rod *TN* of the air-pump, by the pressure of the plug 1 upon the spanner *M* has shut the steam valve *a* and the eduction valve *d*, while the plug 2 has, by means of the spanner, opened the eduction valve *b*, and the steam valve *c*. The steam, therefore, which is above the piston, rushes through the eduction valve *b* into the condenser *i*, where it is converted into water by the jet in the middle of it, and by the coldness arising from the surrounding fluid *w*, while, at the same time, a new quantity of steam from the boiler issues through the open steam valve *c*, into the cylinder, forces up the piston, and, by raising one end of the working beam, and depressing the other, makes the wheel *U* describe the other semi-circumference of *S*, and causes the fly and the machinery on its axis to perform another complete revolution. As the plugs 1, 2, ascend with the piston *q*, they open or shut the steam and eduction valves, and the operation of the engine may be thus continued for any length of time.

From this brief description of the steam engine, the reader will be enabled to perceive the nature and appreciate the value of Mr. Watt's improvements. It had hitherto been the practice to condense the steam in the cylinder itself, by the injection of cold water; but the water which is injected acquires a considerable degree of heat from the cylinder, and being placed in air, highly rarified, part of it is converted into steam, which resists the piston, and diminishes the power of the engine. When the steam is next admitted, part of it is converted into water by coming in contact with the cylinder, which is of a lower temperature than the steam, in consequence of the destruction of its heat by the injection-water. By condensing the steam, therefore, in the cylinder itself, the resistance to the piston is increased by a partial reproduction of this elastic vapour, and the impelling power is diminished by a partial destruction of the steam which is next admitted. Both these inconveniencies Mr. Watt has in a great measure avoided, by using a condenser separate from the cylinder, and incircled with cold water;* and by surrounding the cylinder with a wooden case, and interposing light wood ashes, in order to prevent its heat from being abstracted by the ambient air.

The greatest of Mr. Watt's improvements con-

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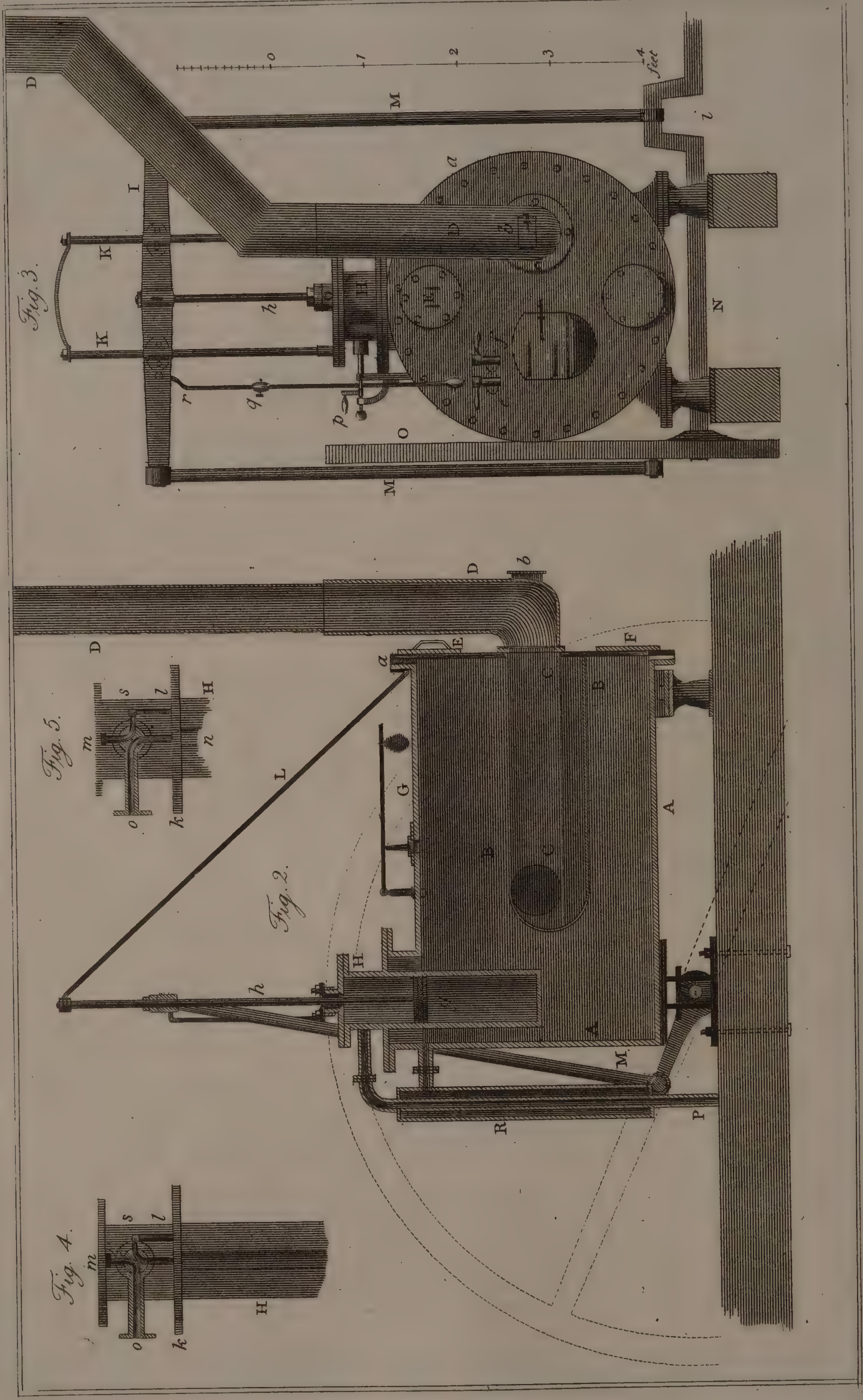
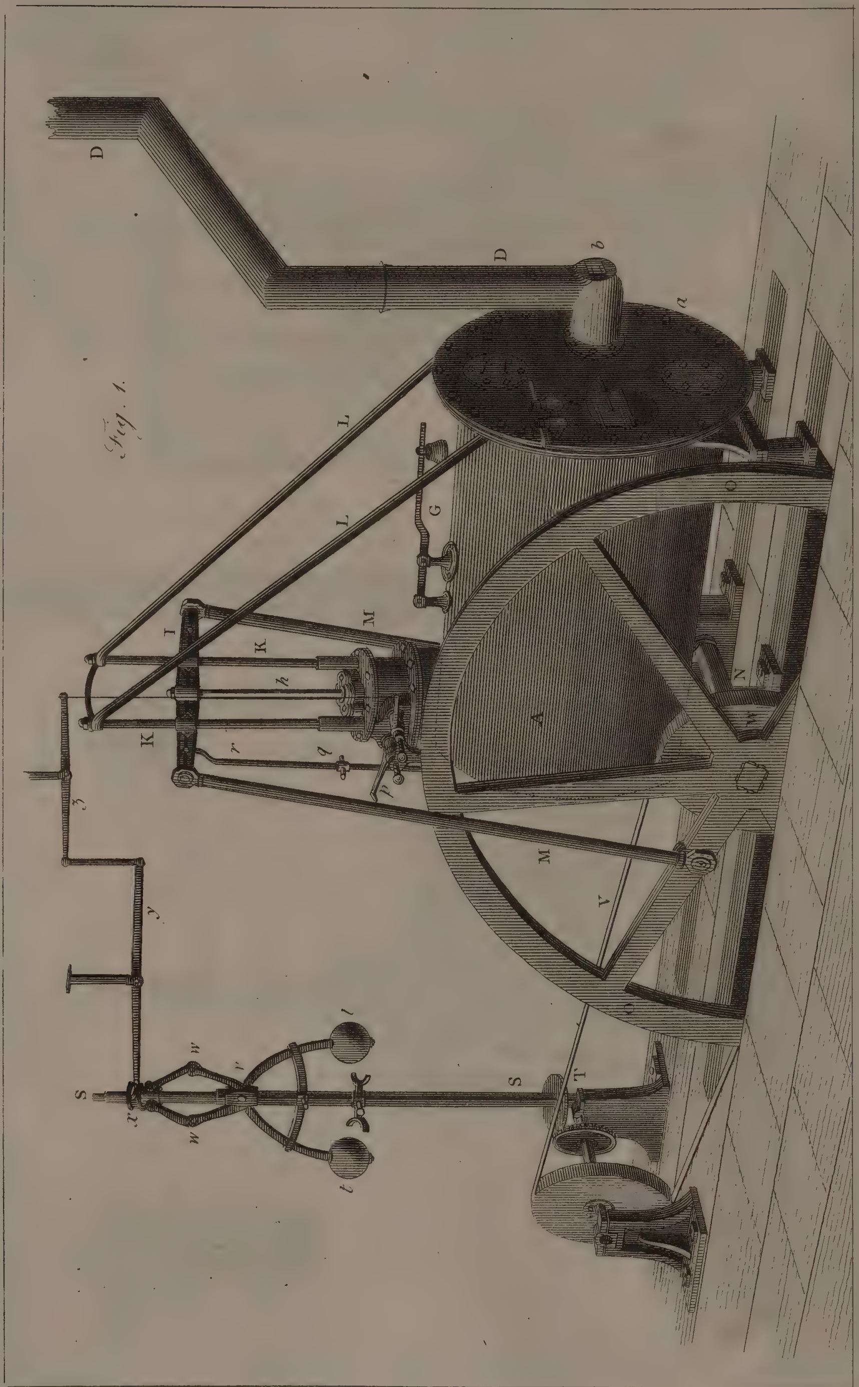
* Even in Mr. Watt's best engines, a very small quantity of steam remains in the cylinder, having the temperature of the hot-well *p*, or of the water, into which the ejected steam is converted. Its pressure is indicated by a barometer, which Mr. Watt has ingeniously applied to his engines for exhibiting the state of the vacuum.

STEAM ENGINE.



London, Published by Sherwood & Co. Paternoster Row, Jany. 1, 1813.

STEAM ENGINE.



J. Farey, Junr. del.

Mutlow, sc. Russell. Ct.

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sists in his employing the steam both to elevate and depress the piston. In the engines of Newcomen and Beighton, the steam was not the impelling power, it was used merely for producing a vacuum below the piston, which was forced down by the pressure of the atmosphere, and elevated by the counterweight at the farther extremity of the great beam. The cylinder, therefore, was exposed to the external air at every descent of the piston, and a considerable portion of its heat being thus abstracted, a corresponding quantity of steam was of consequence destroyed. In Mr. Watt's engines, however, the external air is excluded by a metal plate at the top of the cylinder, which has a hole in it for admitting the piston rod; and the piston itself is raised and depressed merely by the force of steam.

When these improvements are adopted, and the engine constructed in the most perfect manner, there is not above $\frac{1}{4}$ part of the steam consumed in heating the apparatus; and, therefore, it is impossible that the engine can be rendered $\frac{1}{4}$ more powerful than it is at present. It would be very desirable, however, that the force of the piston could be properly communicated to the machinery without the intervention of the great beam. This, indeed, has been attempted by Mr. Watt, who has employed the piston-rod itself to drive the machinery; and Mr. Cartwright has, in his engine, converted the perpendicular motion of the piston into a rotatory motion, by means of two cranks fixed to the axis of two equal wheels which work in each other. Notwithstanding the simplicity of these methods, none of them have come into general use, and Mr. Watt still prefers the intervention of the great beam, which is generally made of hard oak, with its heart taken out, in order to prevent it from warping. A considerable quantity of power, however, is wasted by dragging, at every stroke of the piston, such a mass of matter from a state of rest to a state of motion, and then from a state of motion to a state of rest. To prevent this loss of power, a light frame of carpentry has been employed by several engineers instead of the solid beam. Cast iron beams have been adopted with great success.

We have already glanced at Mr. Cartwright's engine; but think it right to develop a little farther its construction, as it evinces much ingenuity. See Pl. 165, fig. 2, where *a* is the cylinder, which is supplied with steam from the boiler through the pipe *b*; *c* is the piston in the act of going up; *d* is the pipe that conducts the steam into the condenser *e*, which consists of two cylinders, one within the other, leaving a small space between them, into which the steam is admitted; while the inner cylinder is filled with cold water, and also the external cylinder surrounded by the same; so that, by this means, a very large surface of steam is exposed, though no water is suffered to come into actual contact with it.

To the bottom of the piston, *c*, is attached a rod, with another piston, *e*, working in the pipe *d*. When the piston *e* arrives at the bottom of the cylinder, a valve which is in the piston is opened by its pressing against the bottom, and opens a communication with the condenser, whilst the spring *k*, fixed to the rod of the piston, shuts the valve which admits the steam from the boiler. The steam, therefore, being thus condensed, runs into the lower pipe *f*. The piston *e*, arriving at the bottom of the pipe in which it works at the same time with *c*, presses upon the condensed water, shuts the valve *f*, and forces the water up the pipe *g*, into the box *h*. The air which is disengaged from the water rises to the top of the box, and, by its elasticity, forces the water through the pipe *i*, which carries it back again into the boiler. When the air accumulates in the box to such a degree as to depress the water, the ball-cock falls with it, and opens a valve in the top of the box, which suffers some of the air to escape.

When all the steam is condensed, the motion of the fly attached to the machine brings the piston up again, its valve now remaining shut by its weight. On arriving at the top, it presses up the steam-valve, which admits the steam from the boiler to force it down as before.

l and *m* are two cranks, upon whose axis are two equal wheels working in each other, for the purpose of converting the perpendicular motion of the piston-rod into a rotatory motion, for working the machinery attached to it.

But the most valuable part of this engine is in the construction of the piston, which Mr. Cartwright made wholly of metal, and so as, by means of springs, to fit the cylinder very exactly. This not only saves the expence and trouble of packing, which they are obliged frequently to renew in all other engines, but also saves a great deal of steam, on account of the more accurate fitting of the piston.

As it is evident, from its construction, that the whole of the steam is brought back again into the boiler, it affords the means of employing ardent spirit instead of water, and thus saving a great deal of fuel.

This machine seems to be peculiarly applicable to purposes requiring only a small power, as it is not expensive, and occupies little room.

Besides these there are several other truly ingenious constructions of the steam engine, by the Hornblowers, by Trevethick, Woolf, Murray, Bramah, Maudsley, &c. for descriptions of some of which the reader may consult the 2d vol. of Gregory's Mechanics, and for many others, the successive volumes of the Repertory of Arts and Manufactures. We cannot here find room to describe more than one other variety, which is the

High Pressure Steam Engine.—In this construction the operation is solely by the expansive force of the steam, which is not condensed in the manner of the atmospheric or Boulton's engines. Steam being raised in a boiler, and heated far beyond the boiling point, acquires a great expansive force, and exerts an immense pressure to escape from any vessel it is confined in: this steam being admitted into one end of a cylinder, while a communication is opened with the other end to the open air, will exert a pressure upon the piston of the cylinder, and move it from one end to the other. Such is the principle of this engine. Its construction is detailed in plates 163 and 164; the former containing a perspective view of the whole engine, and the latter a section and elevation of it; the same letters of reference being used throughout. *AA* is the boiler, being a cylinder of cast iron with a flaunch at one end to screw on the end *a*. The fire is contained in a cylinder *BB*, fig. 2, of wrought iron, included within the former and surrounded with the water, the fire-grate *CC* extending across it, and the space beneath forming the ash-pit. At the farther end, the fire-place is connected with an iron tube, (shewn by the dark circle in fig. 2), which returns through the lid *a* of the boiler, and turns up at *DD*, forming the chimney which conveys away the smoke. In the pipe *D* is a small door *b* to remove the soot which may accumulate there. *E* is a hole covered by a lid to clean the boiler, and *F* another of the same kind, to let off the water; *ef* are the gauge cocks for ascertaining the height of the water in the boiler; one is placed a small quantity above the intended water line, and the other as much below it: if, therefore, the cocks, when opened, both emit water, it shews the boiler has too much water, or if on the other hand both give steam, the water is too low; as was the case with respect to Watt's engine. On the top of the boiler at *G* a valve is fixed, and kept down by a kind of steelyard, loaded with a weight: if the pressure of the steam exceed 60 lbs. per square inch, so as to endanger the bursting of the boiler, this valve is lifted up by the pressure, and allows the excess of steam to escape. *H* is the steam cylinder fitted into the boiler; it is provided with a piston *g*, and a lid with a stuffing box, through which the piston rod *h* passes, and is at its upper end fastened to a cross bar *I*, guided in a vertical motion by sliding upon two parallel iron rods *KK*, firmly fixed to the cylinder, and supported by stays *LL* extending to the other end of the boiler. At the ends of the cross rod *I* two connecting rods *MM* are jointed, and these at their lower ends are connected with two cranks, upon an axis *N*, extending across beneath the cylinder, and supported in bearings made in the legs which support the boiler; one of these cranks is shown at *i* fig. 3, the other is only a pin fixed into one of the arms of a fly wheel *OO*. Now as the piston is alternately forced up and down by the pressure of the steam, it moves the rod *I*, and by the connecting rods *M* turns the cranks, the fly wheel by its momentum regulating the motion: the machinery the engine is adapted to is turned by a cog wheel fixed on the end of axis *N*, beyond the crank *i*. It now remains to shew the means by which the steam is brought to act alternately on different sides of the piston: for this, see figs. 4 and 5, where *H* represents the cylinder, and *k* the flaunch by which it is fixed into the boiler. On one side of the cylinder above this flaunch a protuberance is cast to contain the four following passages: one at *l* opening beneath the flaunch, and therefore bringing steam from the boiler to the cock (represented by a small circle) which admits it either into the upper or lower ends of the cylinder; the former through the passage *m*, and the latter by a pipe *n* extending down close by the side of the cylinder to the bottom. The last passage *o* is to allow the escape of the steam when it has passed through the engine. These four passages meet each other at right angles round the cock, which has two curved passages in it to connect the passages at proper times. When in the position fig. 4, the steam entering at *l* passes through *n* down to the bottom of the cylinder, and tends to force the piston upwards: at the same time the passage *m* from the top of the cylinder is open to *o*, allowing the steam contained in the upper part of the cylinder to escape to the open air as the piston rises by turning the cock a quarter round, this action is reversed; steam from *l* being admitted through *m*, into the top of the cylinder, and the steam from the bottom escaping through *n* at *o*, the motion of the cock is produced by a short handle *p*, figs. 1 and 3, fixed on it, and this is moved by pins *q*, projecting from a small rod *r* fixed to the rod *I*, and consequently having the same motion, it moves the cock every time the piston is at the top or bottom of its motion, and by that means reverses the movement.

The steam escaping at the orifice *o* passes down through a pipe *P*, which is conducted into the open air. This pipe is inclosed within another *R*, leaving a small space all round between them: from this pipe is a small passage at the upper end leading into the end of the boiler; into this external pipe *R* at the lower end a pipe is joined, this brings cold water from a small pump worked by the engine, this water passes out into the boiler at the upper end, to supply the loss of water in boiling; but in its passage, this water is heated nearly to boiling by the waste steam in the pipe *P* passing through it, and communicating a heat which would otherwise be lost; to regulate the velocity of the engine, a small cock *s*, figs. 4 and 5, is placed in the passage *l*, by which the quantity of steam admitted to the cylinder can be regulated, or suddenly cut off if the engine is wanted to be stopped. In engines which have a regular and constant load or resistance of work opposed to them, this cock is moved by its handle, till the engine has acquired its intended velocity; but in engines where the work performed is irregular, an apparatus shewn in fig. 1 is introduced; it is called the governor or regulator, and is equally applicable to any other kind of steam engine, or to a water wheel. It consists of a vertical axis *SS*, to which two pendulums *t t*, with iron balls at their ends, are suspended by a joint at *v*: above this the pendulums have short arms *w w*, like a pair of shears, and these arms are connected by iron rods with a ring *x*, having liberty to slide up and down upon the axis. This ring is encompassed by the end of a lever *y*, which is connected by a similar lever *z*, which by a wire moves the handle of the regulating cock before mentioned. The governors are turned by a pair of bevelled wheels at *T* receiving motion, by an endless strap *V* from a pulley *W* fixed on the axis of the fly wheel *OO*. The operation of the machine is as follows: by the revolution of the axis *S*, the centrifugal force of the balls *t t* causes them to recede from the axis, and this by the joints *w w* draws down the end of the levers *y* and *z*, opening the regulating cock to admit just such a quantity of steam as will work the engine at the proper velocity: now if by part of the resistance the engine has to overcome being removed (or by the steam being hotter and consequently more powerful) its velocity is increased, the balls being turned quicker fly out farther from the centre, and close the cock till it comes to the right velocity again; if from opposite causes the engine moves too slow, the balls approach each other and open the cock to give the engine a greater supply of steam; so that this governor always regulates the engine to work with the same velocity under all circumstances: as indeed was observed in the description of Watt's machine, and is merely repeated here, to show the application to the present engine.

On the Power of Steam Engines, and the Method of computing it.

From the account which has been given of the steam engine, and the mode of its operation, it must be evident that its power depends upon the breadth and height of the cylinder, or, in other words, on the area of the piston and the length of its stroke. If we suppose that no force is lost in overcoming the inertia of the great beam, and that the lever by which the power acts is equal to the lever of resistance; then, if steam of a certain elastic force is admitted above the piston q, pl. 162, fig. 1. so as to press it downwards with a force of a little more than 100 pounds, it will be able to raise a weight of 100 pounds hanging at the end of the great beam. When the piston has decended to the bottom of the cylinder, through the space of 4 feet, the weight will have risen through the same space, and 100 pounds raised through the height of 4 feet, during one descent of the piston, will express the mechanical power of the engine. But if the area of the piston q, and the length of the cylinder are doubled, while the expansive force of the steam, and the time of the piston's descent remain the same, the mechanical energy of the engine will be quadruple, and will be represented by 200 pounds raised through the space of 8 feet during the time of the piston's descent. The power of steam engines, therefore, is *cæteris paribus* in the compound ratio of the area of the piston, and the length of the stroke. These observations being premised, it will be easy to compute the power of steam engines of any size.

Thus, let it be required to determine the power of steam engines, whose cylinder is 24 inches diameter, and which make 22 double strokes in a minute, each stroke being 5 feet long, and the force of the steam being equal to a pressure of 12 pounds avoirdupois upon every square inch. The diameter of the piston being multiplied by its circumference, and divided by 4, will give its area in square inches; thus, $\frac{24 \times \overline{3.1416 \times 24}}{4} = 452{\cdot}4$, the number of square inches exposed to the pressure of the steam. Now if we multiply this area by 12 pounds, the pressure upon every square inch, we will have $452.4 \times 12 = 5428.8$ pounds the whole pressure upon the piston, or the weight which the engine is capable of raising. But since the engine performs 22 double strokes, 5 feet long in a minute, the piston must move through $22 \times 5 \times 2 = 220$ feet in the same time; and therefore the power of the engine will be represented by 5428.8 pounds avoirdupois, raised through 220 feet in a minute, or by 10.4 hogsheads of water, ale measure, raised through the same height in the same time. Now this is equivalent to $5428.8 \times 220 = 1194336$ pounds, or $10.4 \times 220 = 2288$ hogsheads raised through the height of 1 foot in a minute. This is the most unequivocal expression of the mechanical power of any machine whatever that can possibly be obtained. But as steam engines were substituted in the room of horses, it has been customary to calculate their mechanical energy in horse powers, or to find the number of horses which could perform the same work. This indeed is a very vague expression of power, on account of the different degrees of strength which different horses possess. But still, when we are told that a steam engine is equal to 16 horses, we have a more distinct conception of its power, than when we are informed that it is capable of raising a number of pounds through a certain space in a certain time.

Messrs. Watt and Boulton suppose a horse capable of raising 32,000 pounds avoirdupois, 1 foot high in a minute, while Dr. Desaguliers makes it 27,500 pounds, and Mr. Smeaton only 22,916. If we divide, therefore, the number of pounds which any steam engine can raise 1 foot high in a minute, by these three numbers, each quotient will represent the number of horses to which the engine is equivalent. Thus, in the present example, $\frac{1194336}{32000} = 37\frac{1}{3}$ horses, according to Watt and Boulton; $\frac{1194336}{27500} = 43\frac{1}{3}$ horses, according to Desaguliers; and $\frac{1194336}{22916} = 52\frac{1}{7}$ horses, according to Smeaton. In this calculation it is supposed that the engine works only eight hours a day; so that if it wrought during the whole 24 hours, it would be equivalent to thrice the number of horses found by the preceding rule.

Before concluding this article, we shall state the performance of some of these engines, as determined by experiment. An engine whose cylinder is 31 inches in diameter, and which makes 17 double strokes per minute, is equivalent to 40 horses, working day and night, and burns 11,000 pounds of Staffordshire coal per day. When the cylinder is 19 inches, and the engine makes 25 strokes of 4 feet each per minute, its power is equal to that of 12 horses working constantly, and burns 3,700 pounds of coals per day. And a cylinder of 24 inches which makes 22 strokes of 5 feet each, performs the work of 20 horses, working constantly, and burns 5,500 pounds of coals. Mr. Boulton has estimated their performance in a different manner. He states, that 1 bushel of Newcastle coals, containing 84 pounds, will raise 30 million pounds 1 foot high; that it will grind and dress 11 bushels of wheat; that it will slit and draw into nails 5 cwt. of iron; that it will drive 1,000 cotton spindles, with all the preparation machinery, with the proper velocity; and that these effects are equivalent to the work of 10 horses. *(Brewster's Ferguson.)*

The largest steam engine which we believe has ever been erected was set up in 1811, by Mr. S. Mayle, at Chauwater mine, in Cornwall. It is equal in power to 1010 horses; and is employed in keeping dry by pumps a mine of 100 fathoms deep.

STEATITE, in mineralogy, soap-stone, a species of talc. See TALCUM.

STEATOCE'LE. (ϛεατοκηλη; from ϛεαρ, suet, and κηλη, a tumor.) A collection of a suetty substance in the scrotum.

STEATOMA. (ϛεατωμα; from ϛεαρ, suet.) An encysted tumor, whose contents are of a suetty consistence.

STEED. *s.* (ꞅꞇeꝺa, Saxon.) A horse for state or war (*Pope*).

STEEL, iron united with carbon. See IRON. Steel has properties distinct from those of iron, which render it of superior value. From its higher degree of hardness, it admits a finer polish and assumes a brighter colour. When tempered, it possesses a higher degree of elasticity, and is also more sonorous. It is more weakly attracted by the loadstone, it receives more slowly the magnetic power, but it preserves it longer. When exposed to a moist air, it does not contract rust so easily as iron. It is also heavier, increasing in weight, according to Chaptal, one hundred and seventieth part. M. Rinman has given, as the result of several accurate experiments on different kinds of steel, the following specific gravity 7,795, while he makes ductile iron 7,700, and crude iron 7,251.

All iron is convertible into steel by exposing it to a certain degree of heat for a certain time, along with a quantity of charcoal. Chemists differ in opinion concerning the nature and effects of this process. Some say that steel is produced by absorbing a quantity of caloric or heat in a latent state, as the older chemists had said it was formed by absorbing phlogiston. Lavoisier seems to have ascribed the qualities of steel to a slight degree of oxydation, others to a combination with plumbago or black lead, and others to an union with carbon. In agreeing with those who say the formation of steel is owing to carbon, we do not differ essentially from those who attribute it to plumbago; for the art of chemistry has now found that these substances are very nearly allied. Plumbago is a true charcoal combined with a little iron. The brilliant charcoal of certain vegetable substances, more especially when formed by distillation in close vessels, possesses all the characters of plumbago. The charcoal of animal substances possesses characters still more peculiarly resembling it. Like it they are difficult to incinerate, they leave the same impression on the hands and upon paper; they likewise contain iron, and become converted into carbonic acid by combustion. When animal substances are distilled by a strong fire, a very fine powder sublimes, which attaches itself to the inner part of the neck of the retort, and this substance may be made into excellent black lead pencils.

There are two ways of making steel, namely, by fusion and by cementation. The first way is used to convert iron into steel immediately from the ore, or from crude or cast-iron. By the second way, bar-iron is exposed to a long continued heat, surrounded by charcoal. Each of these ways has advantages peculiar to itself; but the same causes in fact predominate in both, for both kinds of steel are produced by heat and charcoal. The only difference between the two methods is this: in making steel by fusion, the charcoal is not so equally defended from the access of air, as in the other way.

Swedenborgius has given the following description of the method used in Dalecarlia, for making steel from cast-iron. The ore from which the crude iron to be converted into steel is obtained is of a good kind. It is black, friable, and composed of many small grains, and it produces very tough iron. The conversion into steel is made upon a forge-hearth, something smaller than common. The sides and bottom are made of cast-iron. The tuyere is placed, with very little inclination, on one of the side plates. The breadth of the fire-place is fourteen inches; its length is greater. The lower part of the tuyere is six inches and a half above the bottom. In the interior part of the fire-place, there is an oblong opening for the flowing of the superfluous scoriæ. The workmen first put scoriæ on the bottom, then charcoal and powder of charcoal, and upon these the cast-iron run or cut into small pieces. They cover the iron with more charcoal, and excite the fire. When the pieces of iron are of a red white, and before they begin to melt, they stop the bellows, and carry the mass under a large hammer, where they break it into pieces of three or four pounds each. The pieces are again brought to the hearth, and laid within reach of the workman, who plunges some of them into the fire, and covers them with coal. The bellows are made to blow slowly till the iron is liquefied. Then the fire is increased; and when the fusion has been long enough continued, the scoriæ are allowed to flow out; and at that time the iron hardens. The workman adds more of the pieces of crude iron, which he treats in the same manner: and so on a third and a fourth time, till he obtains a mass of steel of about a hundred pounds, which is generally done in about four hours. This mass is raised and carried to the hammer, where it is forged and cut into four pieces, which are farther beat into square bars four or five feet long. When the steel is thus forged, it is thrown into water that it may be easily broken; for it is yet crude and coarse grained. The steel is then carried to another hearth similar to the former, and there broken in pieces. These pieces are laid regularly in the fire-place, first two parallel, upon which seven or eight others are placed across; then a third row across the second in such a manner, that there is space left between those of the same row. The whole is then covered with charcoal, and the fire is excited. In about half or three quarters of an hour the pieces are made hot enough, and are then taken from the fire, one by one, to the hammer, to be forged into little bars from half a foot to two feet long, and while hot are thrown into water to be hardened. Of these pieces sixteen or twenty are put together, so as to make a bundle, which is heated and welded, and afterwards forged into bars four inches thick, which are then broken into pieces of convenient length for use.

The method of converting iron into steel by cementation is a very simple process. It consists solely in exposing it for a certain time to a strong degree of heat, while closely covered with charcoal, and defended from the external air. The furnaces employed for converting iron into steel (says a manufacturer of this metal), are of different sizes; some capable of converting only three or four tons weight, while others are capacious enough to contain from seven to eight or ten tons. The outsides of these furnaces rise up in the form of a cone, or sugar-loaf, to the height of a very considerable number of feet. In the inside, opposite to each other, are placed two very long chests, made either of stone, or of bricks, capable of bearing the strongest fire; which is placed between the two chests. The bars of iron, after the bottom is furnished with a necessary quantity of charcoal dust, are laid in *stratum super stratum*, with intermediate beds of the charcoal dust, to such a height of the chests, as only to admit of a good bed at top; which is then all covered over to prevent the admission of the common air; which, could it procure an entrance, would greatly injure the operation. The iron being thus situated, the fire is lighted, which is some time before it can be raised to a sufficient degree of heat to produce any considerable effect. After which it is continued for so many days as the operator may judge proper; only now and then drawing out what they call a proof bar. This is done by openings fit for the purpose at the ends of the chest, which are easily and with expedition stopped up again, without occasioning any injury to the contents left behind. When the operator apprehends the conversion is sufficiently completed, the fire is suffered to go out, and the furnace, with its contents, is left gradually to cool. This may take up several days: after which the furnace is discharged by taking out the bars of steel and the remainder of the charcoal dust.

There is a manufactory established in the parish of Cramond, about five miles from Edinburgh, in which this method is practised with great success. Great quantities of steel are made there, which we have reason to believe is of as excellent a quality as any that can be procured from other countries.

When the charcoal is taken out it is found as black as before it was introduced into the furnace, unless by accident the external air has got admittance. The bars preserve their exterior form only; the surface frequently exhibits a great number of tumours or blisters, whence they are called blistered steel.

The hardness of steel is much increased by tempering. This consists in heating it to a red heat, and then plunging it suddenly into cold water. If it be allowed to cool slowly, it still preserves its ductility; or if it be heated again after being tempered, it loses its hardness, and again becomes ductile. In heating steel for tempering it, the most remarkable circumstance is, the different colours it assumes according to the degree of heat it has received. As it is gradually heated it becomes white, then yellow, orange, purple, violet, and at last of a deep blue colour. See IRON.

STEEL. *a.* Made of steel (*Chapman*).

To STEEL. *v. a.* (from the noun.) 1. To point or edge with steel (*Shakspeare*). 2. To make hard or firm (*Addison*).

STEE'LY. *a.* (from *steel.*) 1. Made of steel (*Gay*). 2. Hard; firm (*Sidney*).

STEELE (Sir Richard), a writer of great celebrity, was born in Dublin, but in what year is unknown. His father was a counsellor and private secretary to James, the first duke of Ormond. He received his education at the Charter-house school, in London. He became an author first, as he tells us himself, when an ensign of the guards. He wrote for his own use a little work called The Christian Hero; this book he dedicated to lord Cutts, who afterwards appointed him his secretary, and procured him a captain's commission in lord Lucas's regiment of fusileers. His next appearance as a writer was in the office of Gazetteer. His comedy of The Funeral; or, Grief à la Mode, was acted in 1702, and was very successful. The Tender Husband, came out in 1703, and The Lying Lovers, in 1704. In 1709 he began The Tatler, and ended it in 1711. This paper greatly increased his reputation and interest, and he was soon after made one of the commissioners of the stamp office. He next published, in concert with Addison, The Spectator, the first number of which appeared March 1st, 1711; after that The Guardian, begun March 12th, 1713; then The Englishman, October 6th, the same year. Having a design to serve in the last parliament of queen Anne, he resigned his place of commissioner of the stamp office in 1713, and was chosen member for Stockbridge, in Hampshire; but he did not sit long in the House of Commons, being expelled for writing The Englishman, being the close of a paper so called, and The Crisis. Soon after the accession of George I. he was knighted, and appointed surveyor of the royal stables at Hampton-Court, and governor of the royal company of comedians. He was about this time chosen member for Boroughbridge, in Yorkshire, and after the suppression of the rebellion in the north, was made one of the commissioners of the forfeited estates in Scotland. In 1722 his comedy of The Conscious Lovers was acted with great success; and published with a dedication to the king, for which his majesty made him a present of 500*l.* He died at his seat at Llangunnor, in Caermarthenshire, in 1729. He published many other works besides those first mentioned. He was a ready writer, well versed in polite literature, and of an exceeding lively genius, but not equal in any respect to his friend Addison. (*Watkins*)

STEELYARD, or STILLYARD, in mechanics, a kind of balance, called also, *statera Romana*, or the Roman balance, by means of which the weights of different bodies are discovered by using one single weight only.

The common steelyard consists of an iron beam in which is assumed a point at pleasure, on which is raised a perpendicular. On the shorter arm is hung a scale or bason to receive the bodies weighed: the moveable weight is shifted backward and forward on the beam, till it be a counterbalance to 1, 2, 3, 4, &c. pounds placed in the scale; and the points are noted where the constant weight weighs, as 1, 2, 3, 4, &c. pounds. From this construction of the steelyard, the manner of using it is evident. But the instrument is very liable to deceit, and therefore is not much used in ordinary commerce.

STEELYARD (Chinese). The Chinese carry this statera about them to weigh their gems, and other things of value. The beam or yard is a small rod of wood or ivory, about a foot in length: upon this are three rules of measure, made of a fine silver-studded work; they all begin from the end of the beam, whence the first is extended 8 inches, the second $6\frac{1}{2}$, the third $8\frac{1}{2}$. The first is the European measure, the other two seem to be Chinese measures. At the other end of the yard hangs a round scale, and at three several distances from this end are fastened so many slender strings, as different points of suspension. The first distance makes $1\frac{3}{5}$ or $\frac{8}{5}$ of an inch, the second $3\frac{1}{5}$, or double the first, and the third $4\frac{4}{5}$ or triple of the first. When they weigh any thing, they hold up the yard by some one of these strings, and hang a sealed weight, of about 1¼oz. troy weight, upon the respective divisions of the rule, as the thing requires. Grew's Museum, p. 369.

Steelyard (Spring), is a kind of portable balance, serving to weigh any matter, from 1 to about 40 pounds.

It is composed of a brass or iron tube, into which goes a rod, and about that is wound a spring of tempered steel in a spiral form. On this rod are the divisions of pounds and parts of pounds, which are made by successively hanging on, to a hook fastened to the other end, 1, 2, 3, 4, &c. pounds.

Now the spring being fastened by a screw to the bottom of the rod, the greater the weight is that is hung upon the hook, the more will the spring be contracted, and consequently a greater part of the rod will come out of the tube; the proportions or quantities of which greater weights are indicated by the figures appearing against the extremity of the tube.

For an account of other steelyards, especially the curious and accurate one constructed by M. Paul of Geneva, see the 2d vol. of Dr. Gregory's Mechanics.

Steelyard swing. In the Philos. Trans. (no. 462, sect. 5) is given an account of a steelyard swing, proposed as a mechanical method of assisting children labouring under deformities, owing to the contraction of the muscles on one side of the body. The crooked person is suspended with cords under his arm, and these are placed at equal distances from the centre of the beam. It is supposed that the gravity of the body will affect the contracted side, so as to put the muscles upon the stretch; and hence by degrees the defect may be remedied.

STEENBERGEN, a strong town of Dutch Brabant, in the marquisate of Bergen-op-Zoom. It has a communication with the Maese, and is seven miles N. of Bergen-op-Zoom, and 17 W. of Breda. Lon. 4. 28 E. Lat. 51. 32 N.

STEENKEER, a town of Norway, in the province of Drontheim, 36 miles N.E. of Drontheim. Lon. 11. 34 E. Lat. 63. 50 N.

STEENKIRK, a village of Austrian Hainault, famous for the victory obtained over William III, in 1692, by the duke of Luxemburg. It is 15 miles N. of Mons, and 16 W. of Brussels.

STEENWYCK, a strong town of the United Provinces, in Overyssel, seated on the river Aa; 20 miles S.E. of Slooten, and 32 N. of Deventer. Lon. 5. 50 E. Lat. 52. 50 N.

STEEP. *a.* (ꞅꞇeap, Sax.) Rising or descending with great inclination (*Addison*).

Steep. *s.* Precipice; ascent or descent approaching to perpendicularity (*Dryden*).

To **Steep.** *v. a.* (*stippen*, Dutch.) To soak; to macerate; to imbue; to dip (*Bacon*).

STEE'PLE. (ꞅꞇeopel, ꞅꞇẏpel, Saxon.) A turret of a church, generally furnished with bells. Steeples are denominated from their form, either spires or towers; the first are such as ascend continually diminishing either conically or pyramidally. The latter are mere parallelopipeds, and are covered a-top platform-like. In each kind there is usually a sort of windows, or apertures, to let out the sound, and so contrived at the same time as to transmit it downwards.

Mr. Richard Lovell Edgeworth has lately erected a spire of a new construction on the tower of the church of Edgeworthstown, in Ireland: in which his object was to lessen the expence of adding this great ornament to a steeple. As he completely succeeded, and his method is both new and ingenious, we are persuaded our readers will read with pleasure his own account of the plan and operations, as given in the 30th vol. of Nicholson's Journal.

"This spire is fifty feet high from the base to the star by which it is crowned. See plate 166, fig. 1, which is a section of the tower, the spire, and part of the machinery. The spire was made withinside of the tower, and, when completely finished, was drawn up in a few minutes by machinery, and placed on the tower, where it now stands. It consists of a skeleton of hammered English iron, covered with strong Welsh slates, capped where they meet on the skeleton by large copper beading, which, with the slates, is fastened to the skeleton by copper bands and cramps. The whole is well painted, and covered with sand, so as to imitate stone.

"The skeleton was formed of eight bars of iron, 45 feet long, two inches and a half broad, and three quarters of an inch thick. These dimensions were chosen because they are those of common bars, that are sold by ironmongers. These bars are usually fourteen or fifteen feet long, and I had them welded in a common forge to the length that was requisite. Eight of these were disposed octagonally upon a base, fig. 3, about nine feet in diameter, which is nearly the diameter of the tower. It was made of bar iron an inch square.

"Before the spire was put together in the tower, the parts were previously fitted on the ground, not perpendicularly, but lying sideways, so that each bar could be easily reached by the workmen. With this view I took advantage of a saw-pit, which permitted half the base to lie below the ground, while the apex, or point of the spire, was supported by a bench on the surface of the ground. This enabled me to assemble and fit the bars which were necessary for cross braces, and to combine the bars accurately round the spindle of the weather-cock, and to secure them by a ring of iron.

"The base above mentioned, fig. 3, consisted of four bars of iron, flattened where they crossed each other, with a hole through the middle of each, that received a bolt to bind them together. The ends of each of these bars were so formed, with cheeks, as to permit the bars that composed the spire to lodge within them, and to be fastened to them by screw bolts. Light flat bars *d*, *d*, *d*, held by the same screw bolts, were placed between the bars of the spire, to keep them at due distances

STEEPLE.

PL. 166

Iron Spire at Edgeworthstown.

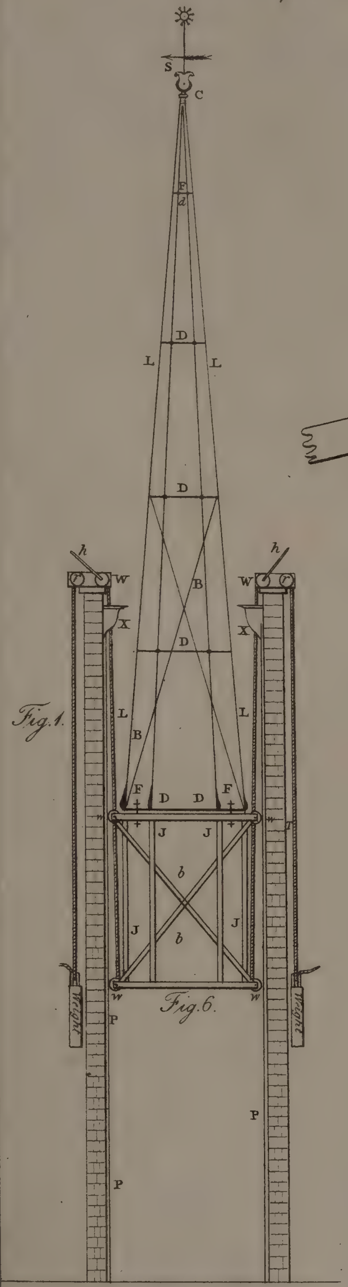

Fig. 1.

Fig. 6.

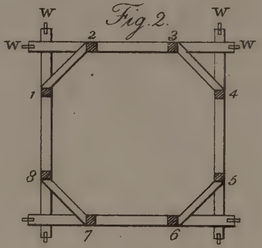

Fig. 2.

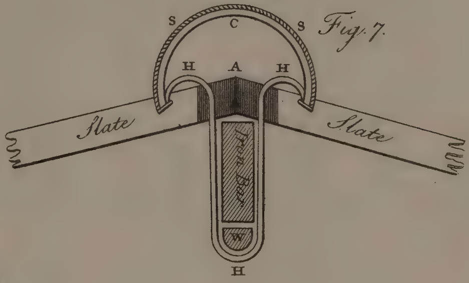

Fig. 7.

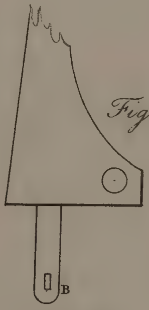

Fig. 4.

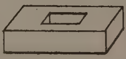

Fig. 9.

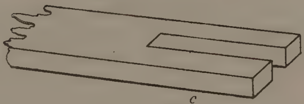

Fig. 8.

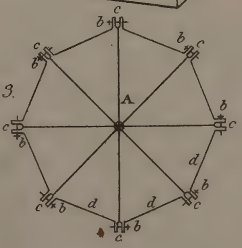

Fig. 3.

London, Published by Sherwood & C.º Paternoster Row, Jan.ʸ 1, 1813.

from each other, thus forming a species of diaphragm, fig. 3, where A represents the diaphragm resembling the rudiments of a spider's web, *c c c*, &c. the cheeks of each transverse bar of the diaphragm, and *b b b* the bolts which connect them with the legs of the spire.

“ Beside these diametrical supports there are four bars, B B, fig. 6, twenty feet long, placed obliquely from the bottom of one bar to the opposite bar, to which they are connected by screw bolts, thus forming angular braces.

“ The spindle of the weathercock rises five feet above the apex of the spire, and, passing downward through the junction of the bars, it is inserted into a solid diaphragm under and against which it is keyed by a forelock.

“ Beside this diaphragm, and that which forms the base of the spire, there are three others D D D, fig. 6, of a construction similar to that of the lowest diaphragm, placed at equal distances from each other. It is to be observed, that the cheeks or ends of the three upper diaphragms project beyond the upright legs of the spire, to assist in supporting the slates; but the cheeks of the lower diaphragm take in not more than two inches of the feet of the bars of the spire; which feet, as may be seen at fig. 4, are considerably broader than the rest of the bars.

“ At B, fig. 4, a tenon is formed at the heel of the foot of each bar, which is to receive a key, or forelock, to fasten the spire to the tower after it has been raised to its place.

“ To raise and guide this spire, a pedestal, the plan and section of which are seen at fig. 2, and 6, was constructed. It consists of a top and base, each formed of four pieces of deal six inches square, and of eight jambs, or uprights, of the same breadth and thickness, and ten feet high, mortised into the base and top, so as to stand nearly under the eight legs of the spire when it is raised upon it. See fig. 6, where J J J show the position of these uprights. The uprights are strengthened by braces, *o b b o*, so as to prevent them from racking, or moving obliquely. The pedestal was furnished with eight wheels six inches in diameter, at its upper corners; and with eight similar wheels at its lower corners; as in the plan, fig. 2, and in the section, fig. 6, *w w*.

“ To facilitate and guide the movement of this pedestal upwards, the tower was lined at each corner with thin planks, P P, fig. 1, fastened to the walls perpendicularly, and adjusted with care. Against these planks the wheels of the pedestal moved upwards with little friction, keeping the spire perpendicular in its ascent.

“ When this pedestal was adjusted, the skeleton, which had been fitted on the ground, was taken to pieces.

“ The base, or lower diaphragm, upon which the bars had been adjusted, was placed and fastened in a temporary manner on the pedestal. The long bars were drawn up, one by one, into the tower above the platform; and their feet were inserted into the cheeks of the base, or lower diaphragm; where they were secured by bolts, as before described. The other diaphragms and the cross braces were then inserted between the iron bars, and firmly bolted to them.

“ By the favour of Messrs. Worthington and Co. of Penrhyn, I was furnished with excellent slates of dimensions sufficiently large to cover the spaces between the bars, which, at the base, were nearly four feet wide. The slates were two feet six inches high, and nearly an inch thick*. These slates were sawed to fit upon the ribs where they met, and they were rabbeted with the saw and chisel to lap over each other, so as to keep out water. They were so well joined by these means as to present one even surface, on which the courses of the slates scarcely appeared through the paint. These joints might by additional paint have been entirely concealed, but their appearance was thought to be advantageous, as it gave an idea of solidity from its nearer resemblance to stone.

“ It remains to show how the slates were fastened to the iron upon which they were placed. For this purpose grooves about one quarter of an inch deep were sawed in the upper surface of each slate, parallel to the bars, and at the distance of nearly two inches from them. A copper capping, nearly semicircular, and about four inches in diameter, was placed so as to cover the joints of the slates, where they met the bars, sinking into the grooves, which were just sufficiently wide to receive the copper. The copper by its shape and elasticity caught in the grooves, so as to form when painted, a covering perfectly impervious to rain and snow.

“ To fasten these copper caps and the slates to the skeleton of the spire a contrivance was adopted, which requires some detail to become intelligible. The general idea was to fasten the capping and the slates from within, so as to leave no holes to be stopped on the outside by putty or paint. Fig. 7 is a section of the slates on a larger scale than that of the spire, where they join on the rib of the copper capping; and of a collar, or band, by which they are connected with an iron cramp that passes round the inside of the rib, and, hooking into the collar or band, is wedged within against the inside of the rib. In looking at this section, care must be taken to distinguish the circular edge of the copper capping from the edge of the band or collar. The band, as may be seen in the drawing, is twice as thick as the capping. In this section of all these parts, as connected together, C is the copper capping; S S, the band or collar; H H, the cramp or holdfast; and W, the wedge.

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* “ The slates were first cut with sand, and such saws as are used for cutting marble. Though this is the method followed at Penrhyn, I found common saws of a smaller size, such as are usually sold for half a crown, far more expeditious.

“ In cutting the grooves, that receive the copper capping, I employed thin saws with a wooden back, which was held in the hand of the workmen. To make these saws, I cut the blade of small saws into four parts with common tinkers' shears.

“ Air holes in form of a *quatre feuille* were made near the top of the spire, to permit the circulation of air, and they serve also to facilitate the application of a moveable scaffold, whenever the spire requires new painting.”

"The whole of this apparatus for fastening the slates succeeded to my wishes: it was easily executed by common workmen; the parts were easily put together; and, when adapted to their several places, they held the slates and their capping firmly upon the bars, at the same time producing a very good effect by raising a bold and ornamental moulding, or torus, fig. 7, on every angle of the spire. It is scarcely necessary to add, that part of the lower corner of each slate was cut away at A to permit the cramps to pass through, and to embrace the iron rib; and that the ends of the diaphragms were permitted to extend beyond the outward surface of the ribs, to support the perpendicular pressure of the slates. Such slates as were not thus supported rested upon the rabbets of those that were beneath them.

"The machinery by which the spire, when it was thus finished, was drawn up, must now be described.

"The plan of the pedestal, the top and bottom of which are similar, is represented at fig. 2, where 1, 2, 3, 4, &c. are the bottoms of the eight jambs, or uprights, of the pedestal; and W W, &c. the wheels or rollers.

"A section of the pedestal, fig. 6, is drawn in the inside of the section of the tower.

"*b b*, cross braces.

"D D the base, or lower diaphragm of the spire, resting on the pedestal, to which it is attached by four bolts (of which two only are seen in the section) with forelocks, F F, so as to be easily detached from each other.

"L L L L, the legs of the spire.

"D D, the diaphragms.

"S, the spindle of the weathercock, passing through the apex of the spire.

"C, a conical collar, or ring, enclosing the top of the legs. A shoulder is formed on the spindle, and rests on this ring; and as the collar, or ring, projects a little above the tops of the legs of the spire, it could be forced downwards till the shoulder touches the tops of all the legs, which are cut even and horizontal at top, so as to permit the collar, the legs of the spire, and the spindle, to be firmly bound together. This is done by means of a mortise, or keyhole, formed in the lower part of the spindle which passes through the small solid diaphragm *d*, against which it is wedged by the forelock *f*.

"The heels of all the bars, with the tenon at B, fig. 4, (where it is drawn upon a larger scale) pass through consols, X X, fig. 1, of stone capped with cast iron that project from the wall of the tower. The iron cappings of these consols, fig. 8, are made of cast iron, and have apertures left in them, through which the heels of the bars which form the spire may pass. When they have all been raised through the consols, eight washers, fig. 9, with a mortise, *m*, in the centre of each of them, are laid upon the consols, and, the spire being allowed to descend, the tenons in the heels of the bars fall into the mortises, and rest upon the consols, and eight other washers are placed upon the tenons under the consols, beneath which they are keyed by forelocks.

"T T, fig. 1, the walls of the tower.

"W W, the horizontal windlasses, over which two of the ropes were coiled once round with weights hung to them.

"*r r*, pullies, over which the ropes passed. Of these there were ten sets, with weights, to counterpoise the pedestal and spire.

"*h h*, handspikes.

"Four men were sufficient to work both the windlasses; and on the 19th of this month, before a very respectable concourse of spectators, the spire was drawn up without difficulty or noise in eighteen minutes. It was soon detached from its pedestal, and fixed in its proper place on the consols with the washers and keys, or forelocks.

"A sufficient number of the counterbalancing weights were cut off by shears; and the men who had worked the windlasses descended upon the pedestal to the bottom of the tower.

"A plumbline was hung from the top of the spire within side, by which it was properly adjusted; and by a few wedges it was placed perfectly upright.

"To add security to the connection between the spire and the tower, iron cramps of seven or eight feet long were hooked into the mortises, which had served to join the legs of the spire to the pedestal, and were firmly fastened to the walls of the tower by proper holdfasts: so that, though the spire and tower may be blown down together, it is scarcely possible that they can be severed by the violence of any storm.

"The cost of this spire has not yet been entirely ascertained, but it does not exceed one hundred and fifty guineas. A spire of the same dimensions, built of Portland stone, would in this country cost at least six times this sum, and if it were formed of the limestone of the country, it would cost four or five hundred pounds.

"I was this day, September the 22d, 1811, enabled to determine whether strong wind had any sensible effect on the spire, as its spindle happens to coincide with a vertical wire of a transit instrument in my observatory. The violence of a sudden squall did not seem in the least to affect it.

"I have therefore reason to hope that it will remain undisturbed by future storms: and, as a thunderstorm passed over this place the night before, I trust that the conductor, which has been attached to the iron legs, will secure the spire from the effects of lightning.

"It has occurred to me since the spire was finished, that, instead of a temporary wooden pedestal, an iron permanent pedestal might be substituted, which might be formed by a continuation of the legs of the spire. At the base of this pedestal, if it were thought necessary, a brick arch might be turned on the lowest diaphragm. This would add weight, and consequently solidity to the mass. This pedestal must be connected with the tower by holdfasts and wedges.

"I mention this, not because I find any inconvenience in what I have executed, but to communicate to the public all that has occurred to me on this subject."

STEE'PLY. *ad.* (from *steep.*) With precipitous declivity.

STEE'PNESS. *s.* (from *steep.*) Precipitous declivity (*Addison*).

STEE'PY. *a.* (from *steep.*) Having a precipitous declivity (*Dryden*).

STEER. *s.* (ꞅꞇẏꞃe, Saxon; *stier*, Dutch.) A young bullock (*Spenser*).

To Steer. *v. a.* (ꞅꞇeoꞃan, ꞅꞇẏꞃan, Saxon; *stieren*, Dutch.) To direct; to guide in a passage (*Spenser*).

To Steer. *v. n.* To direct a course (*Locke*).

STEE'RAGE. *s.* (from *steer.*) 1. The act or practice of steering (*Spect.*). 2. Direction; regulation of a course (*Shak.*). 3. That by which any course is guided (*Dryden*). 4. Regulation or management of any thing (*Swift*).

Steerage, on board a ship, that part of the ship next below the quarter-deck, before the bulk-head of the great cabin, where the steersman stands in most ships of war. See the next article.

STEERING, in navigation, the directing a vessel from one place to another by means of the helm and rudder. He is held the best steersman who causes the least motion in putting the helm over to and again, and who best keeps the ship from making yaws, that is, from running in and out. The perfection of steering, indeed, consists in a vigilant attention to the motion of a ship's head, so as to check every deviation from the line of her course in the first instant of motion, and in applying as little of the power of the helm as possible. By this she will run more uniformly in a straight path: whereas, if a greater effort of the helm is employed it will produce a greater declination from the course, increase the difficulty of steering, and make a crooked and irregular track through the water. There are three methods of steering: 1. By any mark on the land, so as to keep the ship even by it. 2. By the compass, which is by keeping the ship's head on such a rhumb or point of the compass, as best leads to port. 3. To steer as one is bidden, or conned, which, in a great ship, is the duty of him who is taking his turn at the helm. It is the duty of the steersman to watch the head of the ship, by the land, by clouds, and by the heavenly bodies; because, though the course is in general regulated by the compass, the vibrations of the needle are not so instantly perceived as the sallies of the ship's head to the right or the left.

STEE'RSMATE. Stee'rsman. *s.* (*steer* and *man*, or *mate.*) A pilot; one who steers a ship (*L'Estrange*).

STEGANO'GRAPHY. *s.* (ςηγανος and γραφω.) The art of secret writing (*Bailey*).

STEGNO'TIC. *a.* (ςεγνωτικος.) Binding; rendering costive (*Bailey*).

STE'LE. *s.* (ꞅꞇela, Saxon; *stele*, Dutch.) A stalk; a handle.

STELLA (James), a painter, born at Lyons in 1596. He applied himself very early to painting; and succeeded so well, that at twenty he went to Rome for improvement. As he was passing through Florence, the great duke Cosmo de Medicis employed him; and perceiving him to be a man of genius, assigned him lodgings and a pension. He afterwards visited Paris, and was patronized by the king, who allowed him a good pension and lodgings in the Louvre. Here he gave great satisfaction, and was honoured with the order of St. Michael. He died in 1647. He had a fine genius, and all his productions are wonderfully easy.

Stella (Francis), the brother and disciple of the preceding, was born at Lyons in 1601, and travelled with his brother in Italy; but though a good painter, he did not equal James. He died in 1661.

STELLAR. *a.* (from *stella*, Latin.) Astral; relating to the stars (*Milton*).

STELLARIA. Stitch-wort. Chickweed. In botany, a genus of the class decandria, order trigynia. Calyx five-leaved, spreading; petals five, deeply cloven; capsule superior, one-celled, many-seeded, six-toothed at top. Eighteen species, chiefly natives of Europe; seven found wild in the wet woods, wastes, pastures, rivulets, or ditches of our own country.

STELLARIS, in mineralogy, a genus of the class earths, order calcareous. Consisting of carbonat of lime, a smaller proportion of silex, and a little water and oxyd of iron; fibrous in a stellate manner, of a silky lustre, soft, parasitical; easily melting in the fire, with ebullition; partly soluble in nitric acid, with effervescence. One species only, S. Transylvaniæ; found near Unterschebesch in Transylvania, in the harder kind of marmor micans, white or sea-green. Gmelin suspects it may be a zeolite.

STE'LLATE. *a.* (*stellatus*, Latin.) Pointed in the manner of a painted star (*Boyle*).

Stellate leaves. (*Stella*, a star.) Stellata folia. In botany, cum folia plura quam duo verticillatim caulem ambiunt. When more leaves than two (seldom fewer than four, frequently six, eight or more) surround the stem in a whorl; or radiate from the stem like the spokes of a wheel; or like a star, as it is vulgarly represented: exemplified in galium. They are otherwise called verticillate; and come out regularly in sets one above another. A stellate bristle. When a little star of smaller hairs is affixed to the end.—Applied also to the stigma: as in asarum. Stellate flower. The same with the radiate of Tournefort, which Linnéus has adopted.

STELLATÆ. The name of the forty-fourth order in Linnéus's Fragments, in Philos. Bot., and the forty-seventh in his Natural Orders, at the end of Gen. Pl.—The name of a class also in Ray's and Herman's Methods.

STELLA'TION. *s.* (from *stella*, Latin.) Emission of light as from a star.

STE′LLED. *a.* Starry (*Shakspeare*).

STELLERA, in botany, so named in memory of George Wilh. Steller, adjunct of the Academy at Petersburgh, a genus of the octandria monogynia class and order. Natural order of vepreculæ. Thymelææ, Jussieu. Essential character: calyx none; corolla four-cleft; stamens very short; nut one, beaked. There are two species; viz. S. passerina, flax-leaved stellera; and S. chamæjasme, Siberian stellera.

STELLI′FEROUS. *a.* (*stella* and *fero*, Lat.) Having stars.

STE′LLION. *s.* (*stellio*, Lat.) A newt (*Ainsworth*).

STE′LLIONATE. *s.* (*stellionatus*, Latin.) A kind of crime which is committed (in law) by a deceitful selling of a thing otherwise than it really is: as, if a man should sell that for his own estate which is actually another man's (*Bacon*).

STELOCHITES. See Osteocolla.

STEM. *s.* (*stemma*, Latin.) 1. The stalk; the twig (*Waller*). 2. Family; race; generation (*Shakspeare*). 3. (*stammen*, Swedish.) The prow or fore-part of a ship (*Dryden*).

To Stem. *v. a.* (*stæmma*, Islandic.) To oppose a current; to pass cross or forward notwithstanding the stream (*Dryden*).

Stem or Stalk. Caulis. In botany, the body of an herb, bearing the branches, leaves and fructification. According to Linnéus, truncus is the generic term, of which caulis is a species; but in English we apply trunk to the body of a tree, and stalk to that of herbaceous plants. Stem might be adopted as the generic term. See Trunk.

Stem-clasping. Amplexicaulis. Applied to a leaf (folium amplexicaule), when the base surrounds the stem: as in potamogeton perfoliatum, verbascum blattaria, hyoscyamus niger, &c. Applied also to the petiole.

Stem-leaf. Folium caulinum. Inserted into the stem. Opposed to the radical or root-leaf. Applied also to the peduncle.

STEMLESS. Acaulis. Having no stem, properly so called. Opposed in Philos. Bot. (p. 233.) to caulescent.

STEMMATA, in the history of insects, are three smooth hemispheric dots, placed generally on the top of the head, as in most of the hymenoptera and other classes. The name was first introduced by Linnéus.

STEMODIA, in botany, a genus of the class didynamia, order angiospermia. Calyx five-parted; corol two-lipped; stamens four; each filament cloven, and bearing two anthers; capsule two-celled. Six species; natives of the East or West Indies: chiefly herbaceous plants with violet flowers; one or two aquatic.

STEMONITIS, in botany, a genus of the class cryptogamia, order fungi. Fungus with a fugacious or membranous bark, filled with seminiferous fibres elastically expanding themselves. Thirty-one species, of which sixteen are natives of our own country. They are thus subdivided:

A. Receptacle subulate, penetrating the threads.
B. Seminiferous threads on an hemispherical receptacle.
C. Bark membranous, irregularly opening, stipitate.
D. Bark membranous, irregularly opening, stemless.

STEMPHYLA, a word used by the ancients to express the husks of grapes, or the remains of the pressings of wine. The same word is also used by some to express the remaining mass of the olives, after the oil is pressed out.

STEMPHYLITES, a name given by the ancients to a sort of wine pressed hard from the husks.

STEMPLES, in mining, cross bars of wood in the shafts which are sunk to mines. In many places the way is to sink a perpendicular hole, or shaft, the sides of which are strengthened from top to bottom with wood-work, to prevent the earth from falling in: the transverse pieces of wood used to this purpose are called stemples, and by means of these the miners in some places descend, without using any rope, catching hold of these with their hands and feet.

STEMSON, in a ship, an arching piece of timber fixed within the apron, to reinforce the scarf thereof, in the same manner as the apron supports the scarf of the stern. In large ships it is usually formed of two pieces.

STENCH. *s.* (from ꞅꞇencan, Saxon.) A stink; a bad smell (*Bacon*).

To Stench. *v. a.* (from the noun.) 1. To make to stink: not proper (*Mortimer*). 2. (for *stanch*, corruptly.) To stop; to hinder to flow (*Harvey*).

STENCILLING. See Paper-staining.

STENG (Nicolas), a Danish anatomist, was born in 1638. He studied under Bartholin, with whom he was a favourite. He then travelled through Germany, Holland, France, and Italy, and in the latter country obtained a pension from Ferdinand II. grand duke of Tuscany. In 1669 he abjured the protestant religion, and becoming an ecclesiastic, was named by the pope his apostolical vicar for the north. He made several discoveries in anatomy, and wrote some books on medical subjects. He died in 1686.

STENOCORUS, in the entomology of Fabricius, a tribe of the genus Cerambyx, which see.

STENOGRAPHY. (from ϛενος and γραφω.) Short-hand. The art of stenography, or short writing, was known and practised by most of the ancient civilized nations. The Egyptians, who were distinguished for learning at an early period, at first expressed their words by a delineation of figures called hieroglyphics. A more concise mode of writing seems to have been afterwards introduced, in which only a part of the symbol or picture was drawn. This answered the purpose of short-hand in some degree. After them the Hebrews, the Greeks, and the Romans, adopted different methods of abbreviating their words and sentences, suited to their respective languages. The initials, the finals, or radicals, often served for whole words; and various combinations of these sometimes formed a sentence. Arbitrary marks were likewise employed to determine the meaning, and to assist legibility; and it seems probable that every writer, and every author of antiquity, had some peculiar method of abbreviation, calculated to facilitate the expression of his own sentiments, and intelligible only to himself.

It is also probable, that some might by these means take down the heads of a discourse or oration; but few, very few, it is presumed, could have followed a speaker through all the meanders of rhetoric, and noted with precision every syllable, as it dropped from his mouth, in a manner legible even to themselves.

To arrive at such consummate perfection in the art was reserved for more modern times, and is still an acquisition by no means general.

In every language of Europe, till about the close of the sixteenth century, the Roman plan of abbreviating (viz. substituting the initials or radicals, with the help of arbitraries, for words) appears to have been employed. Till then no regular alphabet had been invented expressly for stenography, when an English gentleman of the name of Willis invented and published one. His plan was soon altered and improved, or at least pretended to be so. One alteration succeeded another; and at intervals, for a series of years past, some men of ingenuity and application have composed and published systems of stenography, and doubtless have themselves reaped all the advantages that attend it. But among the various methods that have been proposed, and the different plans that have been adopted by individuals, none has yet appeared fortunate enough to gain general approbation; or proved sufficiently simple, clear, and concise, to be universally studied and practised.

Some systems are replete with unmeaning symbols, perplexing arbitraries, and ill-judged contractions; which render them so difficult to be attained by a common capacity, or ordinary application, that it is not to be wondered at if they have sunk into neglect, and are now no longer known. Other systems, by being too prolix, by containing a multiplicity of characters, and those characters not simple or easily remembered, become ineffectual to the purpose of expedition, and are only superior in obscurity to a common hand. Some, again, not only reject all arbitraries and contractions, but even prepositions and terminations; which, at last, if not too lavishly employed and badly devised, highly contribute to promote both expedition and legibility; and though they reduce their characters to fewer than can possibly express the various modifications of sound, yet they make nearly one half of them complex. In the disposition of the vowels, there is the greatest perplexity in most systems. A dot is sometimes substituted for all the vowels indiscriminately, and the judgment is left to determine which letter out of six any dot is intended to express; or a minute space is allotted them; so that unless they be arranged with mathematical precision they cannot be distinguished from one another; but such a minute attention is inconsistent with the nature of shorthand, which should teach us to write down in a short time, as well as in small bounds, what we wish to preserve of what we hear. Nor is the plan of lifting the pen and putting the next consonant in the vowel's place, in the middle of words, less liable to objections; or that of representing all the vowels by distinct characters, being obviously ill calculated for facility and dispatch, and consequently inadmissible into any useful system.

It is to be confessed, that the person who first proposed the omission of vowels in the middle of words, which it is obvious are not wanted, and invented letters which could be connected as in a running hand without lifting the pen in the middle of the word, made a real improvement on the works of his predecessors. Several other important improvements have been made by some of the late authors on this subject; but we cannot detail them here. The most approved writers on the subject are Mason, Palmer, Byrom, Mavor, Molyneux, Rich, and Gurney; each of whom has some peculiarity, and, perhaps, some advantage; but on the whole we prefer the system of Rich, as improved by Doddridge, and that of Gurney.

STENTATO, a word sometimes used by the Italians to signify that the voice should be thrown out freely in the passages over which it is written, for the expression of some extraordinary emotion.

STENTOROPHO'NIC. *a.* (from *Stentor*, the Homerical herald, and φωνη, a voice.) Loudly speaking or sounding (*Derham*).

STENTOROPHONIC-TUBE, a speaking-trumpet, so called from Stentor, the herald, or crier, mentioned by Homer, and who, as that author tells us, could call louder than fifty men. The Stentorophonic-horn of Alexander the Great is famous: with this, it is said, he could give orders to his army at the distance of one hundred stadia.

To STEP. *v. n.* (ꞅtœppan, Saxon; *stappen*, Dutch.) 1. To move by a single change of the place of the foot (*Wilkins*). 2. To advance by a sudden progression (*Shaks.*). 3. To move mentally (*Watts*). 4. To go; to walk (*Shakspeare*). 5. To come as it were by chance (*Addison*). 6. To take a short walk (*Shakspeare*). 7. To walk gravely or slowly (*Knolles*).

STEP. *s.* (ꞅtæp, Saxon; *stap*, Dutch.) 1. Progression by one removal of the foot (*Add.*). 2. One remove in climbing; hold of the foot; a stair (*Knolles*). 3. Quantity of space passed or measured by one remove of the foot (*Arb.*). 4. A small length; a small space (*Samuel*). 5. (In the plural.) Walk; passage (*Dryden*). 6. Gradation; degree (*Perkins*). 7. Progression; act of advancing (*Newton*). 8. Footstep; print of the foot (*Dryden*). 9. Gait; manner of walking (*Prior*). 10. Action; instance of conduct (*Pope*).

STEP, in composition, signifies one who is related only by marriage; as, *step*-mother.

STEPHANOPHORUS, in antiquity, the chief priest of Pallas, who presided over the rest. It was usual for every god to have a chief priest; that of Pallas was the Stephanophorus just mentioned, and that of Hercules was called Dadouchus.

STEPHANUS (Byzantinus), or of Byzantium, an able grammarian in the fifth or sixth century. He composed a dictionary, of which we have now nothing remaining but a mean abridgment, by the grammarian Hermolaus, dedicated to the emperor Justinian. It was first printed by Aldus Manutius, at Venice, in 1502, folio, and several times since.

STEPHEN (St.), the proto-martyr of Christianity, was one of the seventy deacons, and stoned to death A. D. 33, by the Jews, who accused him of blasphemy. His discourse to that people is preserved in the Acts, and is extremely energetic and convincing.

STEPHEN, king of England, was born in 1105, and crowned in 1135; to the prejudice of Maude, daughter of Henry I. A war ensued, in which Stephen was taken prisoner by the earl of Gloucester, Maude's half brother, but he was afterwards released for that nobleman, who was taken at Winchester. He made peace with Henry, the son of Maude, in 1153, and died the year following.

STEPHENS, a family of printers deservedly celebrated. They flourished at the revival of learning, and contributed a great deal towards dispelling the cloud of ignorance which had so long overshadowed Europe. Some of the classics before the sixteenth century were in a great measure lost, and all of them were exceedingly corrupted. By their abilities and indefatigable industry these defects were supplied, and the learned were furnished with beautiful and correct editions of the Greek and Roman authors. Thus the world was not only supplied with an inexhaustible fund of amusement and instruction in these ancient writings; but it is to the ardour which they inspired, and to the model of elegance which they displayed, that the present advanced state of literature is in a great measure owing.

STEPHENS (Henry), the first of these illustrious men, was born in France, soon after the discovery of printing, perhaps about the year 1465. He settled as a printer at Paris, and was probably patronized by Louis XII. A great proportion of the books which he published were Latin: they are printed in the Roman letter, and are not inelegant, though some of them abound rather too much in contractions. He died about the year 1520, and left behind him three sons, Francis, Robert, and Charles. His widow married Simon de Colines (Colinæus in Latin), who thus got possession of Henry's printing-house, and continued the profession till his death.

Of Francis, the eldest son, little more is known than that he carried on business along with his father-in-law Colinæus, and that he died at Paris in 1550.

STEPHENS (Robert), the second son, was born in 1503. In his youth he made great proficiency in the Roman, Greek, and Hebrew languages, and at the age of nineteen had acquired so much knowledge, that his father-in-law entrusted him with the management of his press. An edition of the New Testament was published under his inspection, which gave great offence to the Paris divines, who accused him of heresy, and threatened to prevent the sale of the book. Soon after he began business himself, and married Perrete, the daughter of Jodocus Badius, a printer and an author. She was a woman of learning, and understood Latin, which indeed was the necessary consequence of her situation. Her husband always entertained a number of learned men as correctors of the press: being foreigners, and of different nations, they made use of no other language but Latin; which Perrete being accustomed to hear, was able in a short time not only to understand, but even to speak with tolerable ease.

In 1531 he published his Latin Thesaurus; a work of great importance, which he laboured at for two years. The mark which he put upon all his books was a tree branched, with a man looking upon it, and these words *noli altum sapere,* to which he sometimes added *sed time.* In 1539 Francis I. made him his printer, and ordered a new set of elegant types to be founded for him. His frequent editions of the New Testament gave great offence to the doctors of the Sorbonne, who accused him of heresy for his annotations, and insisted upon the suppression of some of his books. Although Henry, the French king, in some measure protected him, the persecution of these divines rendered him so unhappy, not to mention the expence and loss of time which an almost constant attendance at court unavoidably occasioned, that in 1552 he abandoned his country and went to Geneva. Here he embraced the protestant religion, and thus justified in some measure the suspicions of his theological enemies. It has been affirmed by several writers that he carried along with him the royal types, and the moulds also in which they were cast; but it is certain that he never afterwards made use of those types. Besides, is it possible that the author of so daring a theft could have been not only protected in Geneva, but even courted and honoured by the most eminent men of the age? Is it credible that such a crime could have been concealed for sixty years; or that Henry, the son and heir of the perpetrator, would have enjoyed the favour of the French king, if Robert Stephens had acted such a shameful part? If he was burnt in effigy at Paris, it was not for theft, but for having changed his religion. After his arrival at Geneva he published an account of the dispute between him and the Paris divines, which does as much honour to his abilities as his Thesaurus does to his learning. He died in 1559, after a life of the most extraordinary industry. The books of which he was the editor were not fewer than 360. Many of them were ancient classics in different languages. Several were accompanied with annotations which he collected, and all of them were corrected by collating manuscripts. He was so anxious to attain perfect accuracy, that he used to expose his proofs in public, and reward those who discovered a mistake. His books consequently were very correct. It is said that his New Testament, called O Mirificam (because the preface begins with these words), has not a single fault.

It was Robert Stephens who first divided the New Testament into verses, during a journey between Paris and Lyons. The advantages of this improvement are fully counterbalanced by its defects. It has destroyed the unity of the books, and induced many commentators to consider every verse as a distinct and independent aphorism. To this in some measure is to be ascribed the many absurd interpretations and creeds that have been forced out of that book.

By his last will his estate was left exclusively to such of his children as should settle at Geneva. He left behind him three sons, Henry, Robert, and Francis.

Stephens (Charles), the third son of Henry, was, like the rest of his family, familiarly acquainted with the learned languages. This recommended him to Lazarus de Baif, who made him tutor to his son, and in 1540 carried him along with him to Germany. He studied medicine, and practised it with success in France. He did not, however, forsake the profession of his family, but exercised it in Paris, where he became the editor of many books remarkable for neatness and elegance. He wrote above thirty treatises on different subjects, particularly on botany, anatomy, and history. He died in 1564.

Stephens (Robert), the son of Robert the first of that name, did not accompany his father to Geneva, but continued to profess the catholic religion, and to reside at Paris. His letter was remarkably beautiful.—He was made king's printer, and died about 1589.

His brother Francis was also a printer. He embraced the protestant religion, and resided at Geneva.

Stephens (Henry), the remaining son of Robert, was born at Paris in 1528. He became the most learned and most celebrated of all his family. From his very birth almost he gave proofs of uncommon abilities, and displayed an ardent passion for knowledge. The Medea of Euripides, which he saw acted while at school, first kindled his love for poetry, and inspired him with the desire of acquiring the language in which that tragedy is written. He intreated his father not to condemn him to study Latin, which he already understood from conversation, but to initiate him at once into the knowledge of Greek. His father willingly granted his request; and Henry applied with such vigour, that in a short time he could repeat the Medea by art. He afterwards studied Greek under Peter Danesius, who was tutor to the Dauphin, and finally heard the lectures of Tusanus and Turnebus. He became eager at an early age to understand astrology, and accordingly attended a professor of that mysterious art; but he was not long in discovering its absurdity. At nineteen he began his travels, which he undertook in order to examine foreign libraries, and to become acquainted with learned men. He spent two years in Italy, and returned into France completely master of Italian, and bringing along with him copies of several scarce authors, particularly a part of Anacreon, which before was thought lost.

He found his father publishing an edition of the New Testament, to which he prefixed some Greek verses.—Soon after, he visited England and the Netherlands, where he met with John Clement, an Englishman, to whom he was indebted for the remaining odes of Anacreon. During this journey he learned the Spanish language, which was very much spoken at that time in the Low Countries.

Whether Henry accompanied his father to Geneva or not, is uncertain; at least he must have returned immediately to France, for we find him soon after established at Paris, and publishing the odes of Anacreon. In 1554 he went to Rome, and thence to Naples. This journey was undertaken at the request, and in the service, of the French government. He was discovered, and would have been arrested as a spy, had he not, by his address and skill in the language of the country, been able to pass himself for a native of Italy. On his return to France, he assumed the title of printer to Ulric Fugger, a very rich and learned German nobleman, who allowed him a considerable pension.

In 1560 he married a relation, as is generally supposed, of Henry Scrimigeour, a Scotch nobleman, with whom he was intimately acquainted. She was a woman, as he himself informs us, endowed with the noblest spirit and the most amiable dispositions. Her death, which happened in 1566, brought on a disease that had twice attacked him before. It was a disgust at all those pursuits which had formerly charmed him, an aversion to reading and the sight of books. It was probably occasioned by too constant and severe an application to literary pursuits. In 1572 he published his Thesaurus Linguæ Græcæ, one of the greatest works, perhaps, that ever was executed by one man, if we consider the wretched materials which more ancient dictionaries could furnish, if we consider the size and perfection of the work, and the immense labour and learning which must have been employed in the compilation. This work had been carried on at a greater expence than he could well bear. He expected to be reimbursed by the sale of the book, but he was unfortunately disappointed. John Scapula, one of his own servants, extracted from it whatever he thought would be most serviceable to students, and published it beforehand in 4to. By this act of treachery Henry was reduced to poverty.

About this time he was much beloved by Henry III. of France, who treated him so kindly, and made him such flattering promises, that he resided frequently at court. But these promises were never fulfilled, owing to the civil wars which soon after distracted France, and the unfortunate death of king Henry himself. During the remainder of his life his situation was very unsettled. We find him sometimes at Paris, sometimes in Geneva, in Germany, and even in Hungary. He died at Lyons in 1598, at the age of seventy. He was fond of poetry from his very infancy. It was a custom of his to compose verses on horseback, and even to write them, though he generally rode a very mettlesome steed. His Thesaurus was his great work, but he was also the author of several other treatises. His poems are numerous: his Apology for Herodotus is a witty satire on the Roman Catholics. His Concordance to the New Testament must have been a laborious work, and has deservedly endeared him to every Christian who wishes to acquire a rational and critical knowledge of the Scriptures. The number of books which he published, though fewer than his father, was great, and superior in elegance to any thing which the world had then seen. A great proportion of them were Greek; he was the editor, however, of many Roman and even of some eastern writings. His Greek classics are remarkably correct; the principal of them are Homer, Anacreon, Æschylus, Maximus Tyrius, Diodorus Siculus, Pindar, Xenophon, Thucydides, Herodotus, Sophocles, Diogenes Laertius, Plutarch, Plato, Apollonius Rhodius, Æschynes, Lysias, Callimachus, Theocritus, Herodian, Dionysius Hallicarnassensis, Dion Cassius, Isocrates, Appian, Xiphilin, &c. His temper in the latter part of his life is represented as haughty and severe, owing probably to his disappointments. He left behind him a son and two daughters, one of whom was married to the learned Isaac Casaubon.

Stephens (Paul), the son of Henry, continued his father's profession at Geneva. He was a man of learning, and wrote translations of several books, and published a considerable number of the ancient classics; but his editions possess little of his father's elegance. He died in 1627, at the age of sixty, after selling his types to one Chouet a printer.—His son Antony, the last printer of the family, abandoned the protestant religion, and returned to France, the country of his ancestors. He received letters of naturalization in 1612, and was made printer to the king; but managing his affairs ill, he was reduced to poverty, and obliged to retire into an hospital, where he died in 1674, miserable and blind, at the age of eighty.

STE'PPINGSTONE. *s.* (*step* and *stone*.) Stone laid to catch the foot, and save it from wet or dirt (*Swift*).

STERBECKIA, in botany, a genus of the class polyandria, order monogynia. Calyx three or five-leaved; petals three or five; capsule barky, not opening, legume-shaped, many-seeded; seeds imbricate, imbedded in pulp. One species only, a climbing shrub of Guiana, with elliptic, entire, glabrous leaves, and small white flowers upon lateral peduncles.

STERCORA'CEOUS. *a.* (*stercoraceus*, Lat.) Belonging to dung (*Arbuthnot*).

STERCORA'TION. *s.* (from *stercora*, Lat.) The act of dunging (*Ray*).

STERCULIA, in botany, a genus of the class dodecandria, order monogynia. Calyx five-parted; corolless; nectary campanulate, five-toothed, bearing the stamens, seated on the column of the germ; germ pedicelled; capsules five, one-celled, opening at the inner side, many-seeded. Eight species, natives of the East Indies or Guiana.

STEREOGRAPHIC PROJECTION OF THE SPHERE, is that in which the eye is supposed to be placed in the surface of the sphere. Or it is the projection of the circles of the sphere on the plane of some one great circle, when the eye, or a luminous point, is placed in the pole of that circle.—For the fundamental principles and chief properties of this kind of projection, see Projection.

STEREO'GRAPHY. *s.* (ςερεος and γραφω.) The art of drawing the forms of solids upon a plane (*Harris*).

STEREOMETER, an instrument lately invented in France, for measuring the volume of a body, however irregular, without plunging it in any liquid. If the capacity of a vessel, or, which is the same thing, the volume of air contained in that vessel, be measured, when the vessel contains air only, and also when the vessel contains a body whose volume is required to be known, the volume of air ascertained by the first measurement, deducting the volume ascertained by the second, will be the volume of the body itself. Again, if it be admitted as a law, that the volume of any mass of air be inversely as the pressure to which it is subjected, the temperature being supposed constant, it will be easy to deduce, from the mathematical relations of quantity, the whole bulk, provided the difference between the two bulks under two known pressures be obtained by experiment.

Let it be supposed, for example, that the first pressure is double the second, or, which follows as a consequence, that the second volume of the air be double the first, and that the difference be fifty cubic inches, it is evident that the first volume of the air will likewise be fifty cubic inches. The stereometer is intended to ascertain this difference at two known pressures.

STEREO'METRY. *s.* (ςερεος and μετρεω.) The art of measuring all sorts of solid bodies (*Harris*).

STEREOTYPE PRINTING. See Printing.

STE'RIL. *a.* (*sterile*, French; *sterilis*, Lat.) Barren; unfruitful; not productive; wanting fecundity (*Woodward*).

STE'RILITY. *s.* (*sterilité*, French; *sterili-*

tas, Latin.) Barrenness; want of fecundity; unfruitfulness (*Bentley*).

To STE′RILIZE. *v. a.* (from *steril.*) To make barren; to deprive of fecundity (*Savage*).

STE′RLING. *a.* (from the *Easterlings*, who were employed as coiners.) 1. An epithet by which genuine English money is discriminated (*Bacon*). 2. Genuine; having passed the test (*Swift*).

STE′RLING. *s.* (*sterlingum*, low Latin.) 1. English coin; money (*Garth*). 2. Standard rate.

STERN. *a.* (ꞅꞇẏꞃn, Saxon.) 1. Severe of countenance; truculent of aspect (*Knolles*). 2. Severe of manners; harsh; unrelenting; cruel (*Dryden*). 3. Hard; afflictive (*Shakspeare*).

STERN. *s.* (ꞅꞇeoꞃ, Saxon.) 1. The hind part of the ship where the rudder is placed (*Watts*). 2. Post of management; direction (*Shakspeare*). 3. The hinder part of any thing (*Spenser*).

STERNA. Tern. In zoology, a genus of the class aves, order anseres. Bill subulate, straitish, pointed, a little compressed, without teeth; nostrils linear, tongue pointed; wings very long; tail (mostly) forked. Twenty-five species, scattered over the globe; four of them common to our own country. The tern inhabits the shore, lakes, or large rivers: breeds among small tufts of rushes, and lays three or four eggs of a dull olive colour, spotted with black.

These birds are at all times clamorous and gregarious; but more particularly in spring, during the time of nestling. Then they assemble in large flocks, and their activity seems greatly increased; for they repeat, and re-echo their sharp piercing notes so incessantly, that we cannot approach the place where they breed, without being stunned with their noise. With us, these birds are migratory, leaving our shores regularly on the approach of winter. We shall select a specimen or two.

1. S. hirundo. Greater tern. Two outer tail-feathers half black, half white. Another variety with these feathers entirely white and black legs. The greater tern is about thirteen inches from the tip of the bill to that of the toes; its breadth, when the wings are spread, about two feet. It is a bird of a slender, but elegant form; which is increased by the beautiful plumage with which it is adorned. The back is covered with a fine grey mantle: the breast is of pure white, elegantly contrasted with a large black spot upon the crown of the head, resembling a hat: the bill and legs are red.

In spring, this species arrives on our coasts, and sometimes is seen a considerable way from the shore, in the interior parts of the country, hovering about the lakes and rivers. They are observed by the sailors, during the whole passage from Britain to Madeira; for it is on the small islands adjacent to the Canaries that the vast flocks of these birds are said to nestle.

They are the most active fishers of all the aquatic tribes; instantaneously darting upon the prey they observe, from a great height in the air. After having dived and caught the booty, they as suddenly rise again to their former elevation. The action of the stomach of this tribe is amazingly powerful; the fish being so completely digested in about an hour, that they are ready to swallow a new meal. Those parts of their food that are nearest the bottom of the stomach are first dissolved, and make way for the rest, which soon undergoes the same process. This, too, is the case with the herons, and some others of the piscivorous tribes. This species of tern is pugnacious: the individuals often dispute about their prey; and the one who is able to prevent it from being snatched from him swallows it, though it be often so much larger than the capacity of his stomach, that the tail is seen hanging out from the bill.

Immediately after their arrival commences the pairing season; during which, each female chooses a warm bed of sand, where she deposits three eggs, of a size far superior to what we should expect from a bird of her dimensions. What seldom happens among birds of the same species, the eggs of the tern are of different colours, some grey, others brown, and some of a greenish hue. The manner in which their eggs are hatched is as singular as their external appearance; for it is accomplished, in a great measure, by the heat of the sun. If the weather be dry and warm, the female seldom hatches by day, but resumes her maternal functions regularly, about the time that the influence of the sun begins to decrease.

The young are not all protruded at the same time; but in the order in which the eggs were laid, and at the interval of a day between each of the three birds. This is also an effect of the heat of the sun; for the first egg is no sooner laid, than, by being exposed to his rays, it begins to undergo the process of hatching, while the rest, being yet in the body of the bird, have not begun to germinate. If, however, during the period of laying, the weather be cold or rainy, the same consequence does not follow; for then, the eggs that were first laid have not been forwarded by the action of the sunbeams. From some experiments, or rather observations, that have been made upon the incubation of the sea pie, it is probable, that the incubation of all birds that lay in the sand is affected in the same manner by the heat of the sun.

The young terns are no sooner protruded from the shell than they leave the nest and follow the parent birds, who supply them with small morsels of those fishes upon which they themselves feed. Here, however, there is a delicacy of management required from the circumstances already mentioned. As only one bird appears the first day, it is led back in the evening to the nest, where the female sits in order to complete the hatching of the remaining two. There it shelters itself beneath her wings, and on the second evening finds a new companion. On the third, the whole family is produced, and becomes from that time independent of further clutching; for the young birds, by creeping close together, communicate sufficient heat.

During the whole period of incubation, the parent birds display great solicitude for the safety of their eggs and their young. Should a person then approach their nest, both parents tumble down from the air, and flutter about him, uttering all the while piercing screams expressive of their fear, anxiety, or rage. These parental cares, however, soon cease. The young soon become capable of pecking their own food, when provided for them. For a few days at first they are fed by the mother's bill: afterwards, what food the parents provide they bestow without even alighting upon the ground. Fond of indulging in their aerial excursions, they drop the food down upon their young that are waiting below, and ready to receive it. Even then, however, the ties of parental affection are not broken: the old birds, far above, still continue to watch over them, and to warn them of the approach of danger by their cries; on hearing which, the young instantly squat down upon the sand, where they continue motionless, till, by the silence of their parents, their apprehensions are removed. Their colour so nearly resembles that of the sand, that it would be difficult to find the young, were their pursuers not directed to the place by those very cries by which the parents mean to protect them.

The terns are provided with very large wings; and, from this circumstance, the young are not soon able to fly. It is not till six weeks after their appearance from the shell, that their wings have attained sufficient length to accommodate them for flight. In this circumstance, they resemble the land swallow, which remains longer in the nest than any bird of its size, and leaves it more completely feathered. During all this period of incapacity and nonage, the parent terns continue to shower down plentiful supplies of food to their young, who already begin to fight and dispute for their prey, displaying that insatiable gluttony which characterises their race. The colour of the first plumage is a whitish grey; the true colour is not assumed till after the first molting.

The smaller tern, S. minuta, and the black species, S. fissipes, have nothing in either their manners or appearance so different from the greater tern as to require a particular detail. The first is eight and a half, the second ten inches long: both inhabit Europe and America. There is a spotted kind, S. cantiaca, sometimes seen on the Kentish coast, of singular beauty: it is called guifette by the French. This bird differs considerably in its manners from all the rest of this tribe: it lives principally upon insects; not so clamorous as the common tern; and builds its nest, not upon the sand, but upon tufts of grass.

The noddy is also a species of this genus, and is described by Linnéus under the name of S. stolida. Its body is black; front whitish; eyebrows black; hind-head cinereous; bill and legs black. It is fifteen inches long, and inhabits chiefly within the tropics.

STE'RNAGE. *s.* (from *stern.*) The steerage or stern: not used (*Shakspeare*).

STERNE (Laurence), descended from Sterne, archbishop of York, was born at Clomwell, in the south of Ireland, 1713, where his father, an officer in the army, was then stationed; and after being nine years at school, at Halifax, Yorkshire, he entered at Jesus college, Cambridge. He obtained the living of Sutton, and afterwards a prebend in York cathedral, and then Stillington. In 1760 he transferred his residence to London to commence author, and in 1762 he travelled to France, and afterwards to Italy for the recovery of his health; but his disorder was a consumption, which could not be removed. He died in 1768, in London, and Garrick, his friend, penned these four elegant lines for his epitaph:

Shall pride a heap of sculptured marble raise,
Some worthless, unmourned, titled fool to praise;
And shall we not by one poor grave-stone learn,
Where genius, wit, and humour, sleep with Sterne?

His works consist of the Life and Opinions of Tristram Shandy, a sentimental romance, remarkable for its eccentricity; a Sentimental Journey; Sermons; and Letters, published since his death.

This author writes much in praise of benevolence, and declares that no one who knew him could suppose him one of those wretches who heap misfortune upon misfortune: but we have heard anecdotes of him extremely well authenticated, which proved that it was easier for him to praise this virtue, and indeed most others, than to practise them. His wit is universally allowed; but many readers have persuaded themselves that they found wit in his *blank* pages, while it is probable that he intended nothing but to amuse himself with the idea of the sage conjectures to which these pages would give occasion. Even his originality is not such as is generally supposed by those fond admirers of the Shandean manner, who have presumed to compare him with Swift, Arbuthnot, and Butler. He has borrowed both matter and manner from various authors, as every reader may be convinced by the learned, elegant, and candid comments on his works, published by Dr. Ferrier, in the fourth volume of the Memoirs of the Literary and Philosophical Society of Manchester. His private character while he lived at York was so bad, that when it was his turn to preach in the cathedral, many of the congregation would leave their pews and walk out of the church when they saw him ascend the pulpit.

STERNHOLD (Thomas), a poet, born in Hampshire, and educated at Winchester school and Oxford. He was groom of the robes to Henry VIII. and had 100 marks left him by the king's will. He was a rigid reformer, and was so highly offended at the obscene songs then in vogue, that he turned into English metre fifty-one of David's psalms for the use of the courtiers. These were introduced into parochial churches, and are still in repute, though the more elegant version of Tate and Brady, and still more that of Merrick, recommend themselves more powerfully to the musical ear; while those of Watts are far preferable to either in point of poetry; and in point of fitness to excite devotional sentiment, they are infinitely superior to any version of the psalms whatever. Of the rest of the psalms, fifty-eight were translated by Hopkins, a contemporary poet, and the remainder by Norton and other hands. He died 1549.

STE'RNLY. *ad.* (from *stern.*) In a stern manner; severely; truculently (*Milton*).

STE'RNNESS. *s.* (from *stern.*) 1. Severity of look (*Spenser*). 2. Severity or harshness of manners (*Dryden*).

STERNO. Names compounded of this word belong to muscles which are attached to the sternum; as,

S. CLEIDO-HYOIDEUS. See STERNO-HYOIDEUS.

S. CLEIDO-MASTOIDEUS. Sterno-mastoideus and cleido-mastoideus of Albinus. Mastoideus of Winslow. A muscle, on the anterior and lateral part of the neck, which turns the head to one side and bends it forward. It arises by two distinct origins; the anterior tendinous and fleshy, from the top of the sternum near the junction with the clavicle; the posterior fleshy, from the upper and anterior part of the clavicle; both unite a little above the anterior articulation of the clavicle, to form one muscle, which runs obliquely upwards and outwards to be inserted, by a thick strong tendon, into the mastoid process of the temporal bone, which it surrounds; and gradually becoming thinner, is inserted as far back as the lambdoidal suture.

S. COSTALES. Vesalius considered these as forming a single muscle on each side, of a triangular shape; hence we find the name of triangularis adopted by Douglas and Albinus; but Verheyen, who first taught that they ought to be described as four or five distinct muscles, gave them the name of sterno costales; and in this he is very properly followed by Winslow, Haller, and Lieutaud.

These muscles are situated at each side of the under surface of the sternum, upon the cartilages of the third, fourth, fifth, and sixth ribs. Their number varies in different subjects; very often there are only three, sometimes five, and even six, but most usually we find only four.

The lowermost of the sterno costales, or what would be called the inferior portion of the triangularis, arises tendinous and fleshy from the edge and inner surface of the lower part of the cartilago ensiformis, where its fibres intermix with those of the diaphragm and transversalis abdominis. Its fibres run nearly in a transverse direction, and are inserted, by a broad thin tendon, into the inner surface of the cartilage of the sixth rib, and lower edge of that of the fifth.

The second and largest of the sterno costales arises tendinous from the cartilago ensiformis and lower part of the sternum, laterally, and, running a little obliquely outwards, is inserted into the lower edge of the cartilage of the fifth, and sometimes of the fourth rib.

The third arises tendinous from the sides of the middle part of the sternum, near the cartilages of the fourth and fifth ribs, and, ascending obliquely outwards, is inserted into the cartilage of the third rib.

The fourth and uppermost, which is the most frequently wanting, arises tendinous from the beginning of the cartilage of the third rib and the adjacent part of the sternum, and running almost perpendicularly upwards, is inserted by a thin tendon (which covers a part of the second internal intercostal), into the cartilage and beginning of the bony part of the second rib.

All these muscles are more or less intermixed with one another at their origin, and this probably occasioned them to be considered as one muscle. Fallopius informs us, that the plate Vesalius has given of them was taken from a dog, in which animal they are much larger than in man. Douglas has endeavoured to account for this difference, but his explanation is far from being satisfactory.

S. HYOIDEUS. As this muscle arises from the clavicle, as well as from the sternum, Winslow calls it sterno-cleido-hyoideus. It is a long, flat, and thin muscle, situated obliquely between the sternum and os hyoides, behind the lower part of the mastoideus, and covering the sterno-thyroideus and the hyo-thyroideus. It arises, by very short tendinous fibres, from the cartilaginous part of the first rib, from the upper and inner part of the sternum, from the capsular ligament that connects that bone with the clavicle, and commonly from a small part of the clavicle itself; from thence, ascending along the anterior and lateral part of the neck, we see it united to its fellow, opposite to the inferior part of the larynx, by means of a thin membrane, which forms a kind of linea alba. After this the two muscles separate again, and each passing over the side of the thyroid cartilage, is inserted into the basis of the os hyoides, immediately behind the insertion of the last described muscle.

Its use is to draw the os hyoides downwards.

S. MASTOIDEUS. See STERNO-CLEIDO-MASTOIDEUS.

S. THYROIDEUS. (*musculus sterno-thyroideus.*) This is flat and thin, like the preceding muscle, but longer and broader. It is situated at the fore part of the neck, between the sternum and thyroid cartilage, and behind the sterno-hyoideus. It arises broad and fleshy from the upper and inner part of the sternum, between the cartilages of the first and second ribs, from each of which it receives some few fibres, as well as from the clavicle, where it joins with the sternum. From thence, growing somewhat narrower, it ascends, and, passing over the thyroid gland and the cricoid cartilage, is inserted tendinous into the lower and posterior edge of the rough line of the thyroid cartilage, immediately under the insertion of the last described muscle. Now and then a few of its fibres pass on to the os hyoides. Its use is to draw the thyroid cartilage, and consequently the larynx, downwards.

STERNOPTYX, in zoology, a genus of the class pisces, order apodalia. Head obtuse; teeth very minute; without gill-membrane; body compressed, without apparent scales; breast carinate, folded; belly pellucid. One species only, S. diaphana, which inhabits the American seas; small, compressed, truncate before, narrowed and silvery behind.

STERNUM. The breast bone. The sternum, os pectoris, or breast bone, is the oblong, flat bone, placed at the fore part of the thorax. The ossification of this bone in the fœtus beginning from many different points at the same time, we find it, in young subjects, composed of several bones united by cartilages; but as we advance in life, most of these cartilages ossify, and the sternum, in the adult state, is found to consist of three, and sometimes only of two pieces, the two lower portions being united into one; and very often, in old subjects, the whole is formed into one bone. But, even in the latter case, we may still observe the marks of its former divisions; so that, in describing the bone, we may very properly divide it into its upper, middle, and inferior portions.

The upper portion forms an irregular square, which, without much reason, has, by many writers, been compared to the figure of a heart as it is painted on cards. It is of considerable thickness, especially at its upper part. Its anterior surface is irregular, and slightly convex; posteriorly, it is somewhat concave. Its upper middle part is hollowed, to make way for the trachea arteria. On each side, superiorly, we observe an oblong articulating surface, covered with cartilage in the recent subject, for receiving the ends of the clavicles. Immediately below this, on each side, the bone becomes thinner, and we observe a rough surface for receiving the cartilage of the first rib, and, almost close to the inferior edge of this, we find the half of such another surface, which, combined with a similar surface in the middle portion of the sternum, serves for the articulation of the cartilage of the second rib.

The middle portion is much longer, narrower, and thinner than the former; but is somewhat broader and thinner below than above, where it is connected with the upper portion. The whole of its anterior surface is slightly convex, and within it is slightly concave. Its edge, on each side, affords four articulating surfaces, for the third, fourth, fifth, and sixth ribs; and parts of articulating surfaces at its upper and lower parts, for the second and seventh ribs. About the middle of this portion of the sternum we sometimes find a considerable hole, large enough in some subjects to admit the end of the little finger. Sylvius seems to have been the first who described it. Riolanus, and some others after him, have, without reason, supposed it to be more frequent in women than in men. In the recent subject it is closed by a cartilaginous substance; and, as it does not seem destined for the transmission of vessels, as some writers have asserted, we may, perhaps very properly, with M. Hunauld, consider it as an accidental circumstance, occasioned by an interruption of the ossification, before the whole of this part of the bone is completely ossified.

The third and inferior portion of the sternum is separated from the former by a line, which is seldom altogether obliterated, even in the oldest subjects. It is smaller than the other parts of the bone, and descends between the ribs, so as to have been considered as an appendix to the rest of the sternum. From its shape, and its being constantly in a state of cartilage in young subjects, it has been commonly named cartilago xiphoides, ensiformis, or sword-like cartilage; though many of the ancients gave the name of xiphoides to the whole sternum; comparing the two first bones to the handle, and this appendix to the blade of the sword. The shape of this appendix varies in different subjects; in some it is longer and more pointed, in others shorter and more obtuse. Veslingius has seen it reaching as low as the navel, and incommoding the motion of the trunk forwards. In general it terminates obtusely, or in a single point; sometimes, however, it is bifurcated, and Eustachius and Haller have seen it trifid. Very often we find it perforated, for the transmission of branches of the mammary artery. In the adult it is usually ossified and tipped with cartilage, but it very often continues cartilaginous through life, and Haller once found it in this state in a woman who died in her hundredth year.

The substance of the sternum, internally, is of a light, spongy texture, covered externally with a thin, bony plate; hence it happens that this bone is easily fractured. From the description we have given of it, its uses may be easily understood. We have seen it serving for the articulation of seven true ribs on each side, and hence we shall find it of considerable use in respiration. We likewise observed, that it is articulated with each of the clavicles. It serves for the origin and insertion of several muscles; it supports the mediastinum; and lastly, defends the heart and lungs: and it is observable, that we find a similar bone in almost all animals that have lungs, and even in such as have no ribs, of which latter we have an instance in the frog.

STERNUTAMENTORIA, in pharmacy. See PTARMICA.

STERNUTA'TION. *s.* (*sternutatio*, Lat.) The act of sneezing (*Quincey*).

STERNU'TATIVE. *a.* (*sternutatif*, Fr.) Having the quality of provoking to sneeze.

STERNU'TATORY. *s.* (*sternutatoire*, Fr.) Medicine that provokes to sneeze (*Brown*).

STERTOR, a noisy kind of respiration as is observed in apoplexy. A snoring or snorting.

STETTIN, a town of Germany, in the circle of Upper Saxony, in Anterior Pomerania, and capital of that part which belongs to Prussia, situated on the river Oder, which here divides it into four branches. It is large, handsome, and well fortified, with several manufactures; a dock for building of ships. The inhabitants carry on a great trade with England, Holland, France, Spain, Denmark, Sweden, Norway, Prussia, Dantzig, Mecklenburg, Lubeck, and Hamburg. Stettin contains five parish churches, a college of physicians, with a board of health, a chamber of commerce, a court of admiralty, &c. 1400 houses, and about 20,000 inhabitants: 14 miles W.N.W. Stargard, and 74 W. New Stettin. Lon. 14. 44 E. Lat. 53. 30 N.

STEVEN. *s.* (ſteƿen, Sax.) A cry, or loud clamour (*Spenser*).

STEVENAGE, a town in Hertfordshire, with a market on Friday, 12 miles N.N.W. of Hertford, and 31 N. by W. of London.

STEVENS (George Alexander), an actor and poet, was born in London. Inclination or necessity led him early to the stage, in which profession he passed some years in itinerant companies, till at length he procured an engagement at Covent-Garden theatre; but his performances as an actor were contemptible. After living in every kind of dissipation, generally necessitous, and always extravagant, he had the good fortune to hit upon a plan, which enabled him to place himself in independent circumstances. He composed a strange medley of sense and nonsense, wit and ribaldry, adapted to his own powers of performance, called A Lecture upon Heads. With this he travelled about England, and was uncommonly successful. By this expedient he in a few years acquired a fortune sufficient to afford him a comfortable retreat in his old age. He died in 1784. He was author of a novel in two volumes, entitled The Adventures of Tom Fool, and some dramatic pieces.

STEVIA, in botany, a genus of the class syngenesia, order polygamia æqualis. Receptacle naked; seeds crowned with chaff, or awns, or both; calyx cylindrical, with a single row of leaflets. Five species, all Mexican plants, four herbaceous, and one shrubby.

STEVIN, STEVINUS (Simon), a Flemish mathematician of Bruges, who died in 1633. He was master of mathematics to prince Maurice of Nassau, and inspector of the dykes in Holland. It is said he was the inventor of the sailing chariots, sometimes made use of in Holland. He was a good practical mathematician and mechanist, and was author of several useful works: as, treatises on arithmetic, algebra, geometry, statics, optics, trigonometry, geography, astronomy, fortification, and many others, in the Dutch language, which were translated into Latin, by Snellius, and printed in two volumes folio. There are also two editions in the French language, in folio, both printed at Leyden, the one in 1608, and the other in 1634, with curious notes and additions, by Albert Girard. For an account of Stevin's inventions and improvements in algebra, which were many and ingenious, see our article ALGEBRA; or, for a still more detailed account, the excellent history of algebra given by Dr. Hutton, in the second volume of his valuable collection of Tracts, just published.

To STEW. *v. a.* (*estuver*, Fr.) To seeth any thing in a slow moist heat (*Shakspeare*).

To STEW. *v. n.* To be seethed in a slow moist heat.

STEW, a small kind of fish-pond, the peculiar use of which is to maintain fish, and keep them in readiness for the daily use of the family, &c.

STEWS (from the French *estuves*, i. e. *thermæ balneum*), those places which were permitted in England to women of professed incontinency, and that for hire would prostitute their bodies to all comers; so called, because dissolute persons are wont to prepare themselves for venereous acts by bathing; and hot baths were by Homer reckoned among the effeminate sort of pleasures. These stews were suppressed by king Henry VIII. about the year 1546.

STEWARD (*senescallus*, compounded of the Saxon *steda*, i. e. room; or *stead* and *weard*, a ward or keeper), an officer appointed in another's stead or place, and always taken for a principal officer within his jurisdiction. Of these there are various kinds. The greatest officer under the crown is the lord high-steward of England, an office that was anciently the inheritance of the earls of Leicester, till forfeited by Simon de Montfort to king Henry III. But the power of this officer is so very great, that it has not been judged safe to trust it any longer in the hands of a subject, excepting only, *pro hac vice*, occasionally: as to officiate at a coronation, at the arraignment of a nobleman for high-treason, or the like. During his office, the steward bears a white staff in his hand; and the trial, &c. ended, he breaks the staff, and with it his commission expires. There is likewise a lord-steward of the king's household, who is the chief officer of the king's court, has the care of the king's house, and authority over all the officers and servants of the household, except such as belong to the chapel, chamber, and stable.

STEWARD, an officer in a ship of war, appointed by the purser to distribute the different species of provisions to the officers and crew; for which purpose he is furnished with a mate and proper assistants.

Court of the Lord High-Steward of Great Britain, is a court instituted for the trial of peers indicted for treason or felony, or for misprision of either. The office of this great magistrate is very ancient, and was formerly hereditary, or at least held for life, or *dum bene se gesserit*: but now it is usually, and hath been for many centuries past, granted *pro hac vice* only; and it hath been the constant practice (and therefore seems now to have become necessary) to grant it to a lord of parliament, else he is incapable to try such delinquent peer. When such an indictment is therefore found by a grand jury of freeholders in the King's Bench, or at the assizes before the justices of oyer and terminer, it is to be removed by a writ of certiorari into the court of the lord high-steward, which has the only power to determine it. A peer may plead a pardon before the court of King's Bench, and the judges have power to allow it, in order to prevent the trouble of appointing an high-steward merely for the purpose of receiving such plea: but he may not plead in that inferior court any other plea, as guilty or not guilty of the indictment, but only in this court; because, in consequence of such plea, it is possible that judgment of death might be awarded against him. The king, therefore, in case a peer be indicted of treason, felony, or misprision, creates a lord high-steward *pro hac vice* by commission under the great seal; which recites the indictment so found, and gives his grace power to receive and try it *secundum legem et consuetudinem Angliæ.* Then when the indictment is regularly removed by writ of certiorari, commanding the inferior court to certify it up to him, the lord high-steward directs a precept to a sergeant at arms, to summon the lords to attend and try the indicted peer.

STE'WARDSHIP. *s.* (from *steward.*) The office of a steward (*Shakspeare*).

STEWART (the Rev. Dr. Matthew), in biography, late professor of mathematics in the university of Edinburgh, was the son of the Rev. Mr. Dugald Stewart, minister of Rothsay, in the Isle of Bute, and was born at that place in the year 1717. After having finished his course at the grammar school, being intended by his father for the church, he was sent to the university of Glasgow, and was entered there as a student in 1734. His academical studies were prosecuted with diligence and success; and he was so happy as to be particularly distinguished by the friendship of Dr. Hutcheson, and Dr. Simson the celebrated geometrician, under whom he made great progress in that science.

Mr. Stewart's views made it necessary for him to attend the lectures in the university of Edinburgh in 1741; and that his mathematical studies might suffer no interruption, he was introduced by Dr. Simson to Mr. Maclaurin, who was then teaching both the geometry and the philosophy of Newton, and under whom Mr. Stewart made that proficiency which was to be expected from the abilities of such a pupil, directed by those of so great a master. But the modern analysis, even when thus powerfully recommended, was not able to withdraw his attention from the relish of the ancient geometry, which he had imbibed under Dr. Simson. He still kept up a regular correspondence with this gentleman, giving him an account of his progress, and of his discoveries in geometry, which were now both numerous and important, and receiving in return many curious communications with respect to the Loci Plani, and the Porisms of Euclid. Mr. Stewart pursued this latter subject in a different and new direction. In doing so, he was led to the discovery of certain curious and interesting propositions, which he published under the title of General Theorems, in 1746. They were given without the demonstrations; but they did not fail to place their discoverer at once among the geometricians of the first rank. They are, for the most part, Porisms, though Mr. Stewart, careful not to anticipate the discoveries of his friend, gave them only the name of Theorems. They are among the most beautiful, as well as most general propositions, known in the whole compass of geometry, and are perhaps only equalled by the remarkable locus to the circle in the second book of Apollonius, or by the celebrated theorem of Mr. Cotes.

In September, 1747, he was elected professor of mathematics in the university of Edinburgh. The duties of this office gave a turn somewhat different to his mathematical pursuits, and led him to think of the most simple and elegant means of explaining those difficult propositions, which were hitherto only accessible to men deeply versed in the modern analysis. In doing this, he was pursuing the object which, of all others, he most ardently wished to attain, viz. the application of geometry to such problems as the algebraic calculus alone had been thought able to resolve. His solution of Kepler's problem was the first specimen of this kind which he gave to the world. This is founded on a general property of curves, which, though very simple, had perhaps never been observed; and by a most ingenious application of that property, he shows how the approximation may be continued to any degree of accuracy, in a series of results which converge with great rapidity.

This solution appeared in the second volume of the Essays of the Philosophical Society of Edinburgh, for the year 1756. In the first volume of the same collection, there are some other propositions of Mr. Stewart's, which are an extension of a curious theorem in the fourth book of Pappus. They have a relation to the subject of Porisms, and one of them forms the ninety-first of Dr. Simson's Restoration.

He next published the Tracts, physical and mathematical. In the first of these, Dr. Stewart lays down the doctrine of centripetal forces, in a series of propositions, demonstrated (if we admit the quadrature of curves) with the utmost rigour, and requiring no previous knowledge of the mathematics, except the elements of plane geometry, and of conic sections. The good order of these propositions, added to the clearness and simplicity of the demonstrations, renders this tract perhaps the best elementary treatise of physical astronomy that is any where to be found.

In the three remaining tracts, our author had it in view to determine the effect of those forces which disturb the motions of a secondary planet. From this he proposed to deduce, not only a theory of the moon, but a determination of the sun's distance from the earth. The former, it is well known, is the most difficult subject to which mathematics have been applied, and the solution required and merited all the clearness and simplicity which our author possessed in so eminent a degree. It must be regretted therefore that the decline of Dr. Stewart's health, which began soon after the publication of the tracts, did not permit him to pursue this investigation. The other object of the tracts was, to determine the distance of the sun, from his effect in disturbing the motions of the moon; and his inquiries into the lunar irregularities had furnished him with the means of accomplishing it as he supposed: and in 1763, he published his Essay on the Sun's Distance, where the computation being actually made, the parallax of the sun was found to be no more than $6'' 9'''$, and consequently his distance almost 29,875 semidiameters of the earth, or nearly 119 millions of miles. A determination of the sun's distance, that so far exceeded all former estimation of it, was received with surprise, and the reasoning on which it was founded was likely to undergo a severe examination. But, even among astronomers, it was not every one who could judge in a matter of such difficult discussion. Accordingly, it was not till about five years after the publication of Dr. Stewart's work that there appeared a pamphlet, under the title of Four Propositions, by Mr. Davison, intended to point out errors in Dr. Stewart's investigation, which had given a result much greater than the truth. From his desire of simplifying, and of employing only the geometrical method of reasoning, he was reduced to the necessity of rejecting quantities, which were considerable enough to have a great effect on the last result. An error was thus introduced, which, had it not been for certain compensations, would have become immediately obvious, by giving the sun's distance near three times as great as that which has been mentioned.

The Sun's Distance was the last work which Dr. Stewart published; and though he lived to see the animadversions made on it, he declined entering into any controversy. His disposition was far from polemical; and he knew the value of that quiet, which a literary man should rarely suffer his antagonists to interrupt. He used to say, that the decision of the point in question was now before the public; that if his investigation was right, it would never be overturned, and that if it was wrong, it ought not to be defended.

A few months before he published the essay just mentioned, he gave to the world another work, entitled, Propositiones More Veterum Demonstratæ. It consists of a series of geometrical theorems, mostly new; investigated, first by an analysis, and afterwards synthetically demonstrated by the inversion of the same analysis. This method made an important part in the analysis of the ancient geometricians; but few examples of it have been preserved in their writings, and those in the Propositiones Geometricæ are therefore the more valuable.

Dr. Stewart's constant use of the geometrical analysis had put him in possession of many valuable propositions, which did not enter into the plan of any of the works that have been enumerated. Of these, not a few have found a place in the writings of Dr. Simson, where they will for ever remain, to mark the friendship of these two mathematicians, and to evince the esteem which Dr. Simson entertained for the abilities of his pupil. Many of these are in the work upon the Porisms, and others in the Conic Sections, viz. marked with the letter x; also a theorem in the edition of Euclid's Data.

Soon after the publication of the Sun's Distance, Dr. Stewart's health began to decline, and the duties of his office became burdensome to him. In the year 1772, he retired to the country, where he afterwards spent the greater part of his life, and never resumed his labours in the university. He was however so fortunate as to have a son to whom, though very young, he could commit the care of them with the greatest confidence. Mr. Dugald Stewart, having begun to give lectures for his father from the period above mentioned, was elected joint professor with him in 1775, and gave an early specimen of those abilities, which have not been confined to a single science, but have classed him among the first mathematicians in Scotland, and the first metaphysicians in the world.

After mathematical studies (on account of the bad state of health into which Dr. Stewart was falling) had ceased to be his business, they continued to be his amusement. The analogy between the circle and hyperbola had been an early object of his admiration. The extensive views which that analogy is continually opening; the alternate appearance and disappearance of resemblance in the midst of so much dissimilitude, make it an object that astonishes the experienced, as well as the young geometrician. To the consideration of this analogy therefore the mind of Dr. Stewart very naturally returned, when disengaged from other speculations. His usual success still attended his investigations; and he left among his papers some curious approximations to the areas, both of the circle and hyperbola. For some years toward the end of his life, his health scarcely allowed him to prosecute study even as an amusement. He died the 23d of January, 1785, at 68 years of age. See vol. i. Edinburgh Transactions.

STEYNING, a borough in Sussex, with a market on Wednesday. In its church were buried St. Cuthman, and Ethelwolf, king of Wessex, father of Alfred the Great. It is 16 miles W. by N. of Lewes, and 50 S.W. of London.

STIBIALS. (from *stibium.*) Antimonials: medicines prepared from antimony.

STIBIUM. Antimony. In mineralogy, a genus of the class metals. Of a silvery, greyish-white colour, and radiately lamellar texture, softish and very brittle; when rubbed between the fingers, giving them a peculiar taste and smell; specific gravity 6.860: melting at a red heat, and when gradually cooled, exhibiting cubical crystals on the surface; in a greater degree of heat, becoming first a greyish-white oxyd, afterwards an hyacinthine glass, and lastly, volatilizing in white vapours: forming a golden yellow solution in nitromuriatic acid, and depositing a white precipitate if water be poured into the solution. Nine species.

1. S. nativum. Native antimony. Of a

tin-white lustre, melting without sulphurous or arsenical vapours. Found in the mines of Sweden, and in Dauphiny, in irregular masses or kidney-form pieces: colour bright tin or silvery-white; texture lamellar, with straight foliations; deflagrates with nitre, and melts and evaporates before the blow-pipe, leaving a white oxyd; when dissolved in nitro-muriatic acid, it deposits a dark red precipitate by the addition of sulphurated ammonia: specific gravity 6.20; contains

Antimony	98.0
Silver	1.0
Iron	.25
	99.25 *Klaproth.*

2. S. arsenicale. Arsenicated antimony. Of a tin-white lustre, emitting arsenical vapours when heated. Found in Dauphiny, Hungary, and Saxony, in irregular masses; it emits only arsenical fumes when heated, and contains about 16 per cent. of antimony.

3. S. rubrum. Red antimonial ore. Dull red, fibrous, a little shining, emitting sulphurous and arsenical vapours before the blow-pipe. Found in the mines of Bohemia, Hungary, Saxony, and Transylvania, in the form of capillary crystals grouped together, often diverging in a radiate manner; texture fibrous, very soft, brittle: specific gravity 4.090: contains, according to Klaproth,

Oxyd of antimony	78.3
Sulphur	17.7
	98

4. S. argentigo. Plumose antimonial ore. Fibrous, leaving a silvery bead before the blow-pipe, and emitting sulphurous vapours. Found in France, Sicily, Transylvania, Bohemia, Hungary, Saxony, &c. generally on other ores or stones in the form of capillary, straight, or flexuous fibres, which are loose or cohering, parallel or disposed in a divergent manner, and soft like wool; a little shining, friable, and stains the fingers; colour dark blue, grey, or white. It consists of antimony, iron, sulphur, and a little silver and arsenic.

5. S. stibigo. Antimonial ochre. Fibrous, a little shining, emitting sulphurous vapours before the blow-pipe, and entirely evaporating in a more violent heat. Found in Saxony, Bohemia, Hungary, Dauphiny, &c. sometimes friable and earthy, but generally covering the surface of other antimonial ores in the form of soft, downy, capillary, flexible fibres, which are loose or bundled together, or stellately disposed; colour blackish, grey, liver-brown, dull red, violet, greenish, straw-yellow, or variegated, rarely white: does not melt before the blow-pipe, but evaporates and deposits a white powder; with borax it effervesces, and is partly reduced.

6. S. vulgare. Sulphurated antimony. Sulphuret of antimony. Grey sulphurized antimony. Of a steel-grey colour and metallic lustre, ponderous, emitting sulphurous vapours before the blow-pipe, and at last evaporating in white vapours. Four varieties.

α. Compact, of a fine-grained uneven fracture, with a grey metallic streak, and dark-brown earthy powder.

β. Of a foliated texture, and simple fracture, with a grey metallic streak, and dark-brown earthy powder.

γ. Of a radiated texture, with a grey metallic streak, and dark grey powder: the radiated sulphuret of antimony of Thomson.

δ. Of a fibrous or feathery texture, in very small capillary, lanuginous crystals, or fistular, or of a common form. Found in almost every country of Europe, massive, disseminated, or superficial, generally in matrices of quartz, lime, alumina, fluor, or baryte: often stains the fingers, and before the blow-pipe melts with a blue flame, leaving a grey oxyd of antimony. specific gravity from 4.132 to 4.516.

7. S. argentiferum. Of a steel-blue colour, with metallic lustre, and a whitish streak: sometimes in a common form; sometimes in many-sided crystals. Found near Cremnitz in Hungary, and contains antimony 34, copper 31, silver 15, sulphur 11, iron 3.

8. S. phosphoratum. Phosphorated antimony. In acicular, scattered, lamellar, longitudinally streaked crystals, not inflaming, and yielding very little smoke before the blow-pipe. Found in Saxony, in the cavities of a vein of sulphuret of antimony; colour white, yellow, or blackish; soft, flexible, and easily cut: before the blow-pipe it does not inflame or smoke much, but fuses, and leaves a grey, shining, brittle slag, including silvery-white grains; with borax it gives a lead-coloured button, or a reddish-yellow pellucid glass; it is said sometimes to consist of small rectangular four-sided tables, and appears to be a sulphuret of antimony combined with phosphoric acid.

9. S. muriaticum. Muriated antimony. White antimonial ore. White, shining like mother of pearl, radiate in a parallel manner in the form of small, erect, four-sided tables. Found in Bohemia, Dauphiny, Saxony, and Hungary; totally soluble in nitro-muriatic acid, decrepitates in the fire, and easily melts when powdered, evaporating in a white smoke; with borax it leaves a metallic bead. According to Klaproth, it is nothing more than a white oxyd of antimony, containing

Oxyd of antimony	86
——— iron	3
Silex	8
	97

STICHOS, a name given by the old writers to a pectoral confection, the principal ingredient of which was the herb marrubium or horehound.

STICK. *s.* (ꞅꞇıcca, Saxon.) A piece of wood small and long; a slender stem (*Dryden*).

To STICK. *v. a.* preterit *stuck*; participle passive *stuck*. (ꞅꞇıcan, Saxon.) To fasten on so as that it may adhere (*Addison*).

To STICK. *v. n.* 1. To adhere; to unite itself by its tenacity or penetrating power (*Raleigh*). 2. To be inseparable; to be united with any thing (*Sanderson*). 3. To rest upon the memory painfully (*Bacon*). 4. To stop; to lose motion (*Smith*). 5. To resist emission (*Shakspeare*). 6. To be constant; to adhere with firmness (*Hammond*). 7. To be troublesome by adhering (*Pope*). 8. To remain; not to be lost (*Watts*). 9. To dwell upon; not to forsake (*Locke*). 10. To cause difficulties or scruple (*Swift*). 11. To scruple; to hesitate (*Bacon*). 12. To be stopped; to be unable to proceed (*Clarendon*). 13. To be embarrassed; to be puzzled (*Watts*). 14. *To* STICK *out*. To be prominent, with deformity (*Job*). 15. *To* STICK *out*. To refuse concurrence.

To STICK. *v. a.* (ꞅτician, Sax. *steken*, Dut.) 1. To stab; to pierce with a pointed instrument (*Grew*). 2. To fix upon a pointed body; as, he *stuck* the fruit upon his knife. 3. To fasten by transfixion (*Dryden*). 4. To set with something pointed (*Dryden*).

STI′CKINESS. *s.* (from *sticky*.) Adhesive quality; viscosity; glutinousness; tenacity.

To STI′CKLE. *v. a.* 1. To take part with one side or other (*Hud.*). 2. To contest; to altercate; to contend rather with obstinacy than vehemence (*Cleav.*). 3. To trim; to play fast and loose (*Dryden*).

STICKLE-BACK. See GASTEROSTEUS.

STI′CKLER. *s.* (from *stickle*.) 1. A sidesman to fencers; a second to a duellist (*Sidney*). 2. An obstinate contender about any thing (*Swift*).

STI′CKY. *a.* (from *stick*.) Viscous; adhesive; glutinous (*Bacon*).

STIFELS, STIFELIUS (Michael), a Protestant minister, and very skilful mathematician, was born at Eslingen, a town in Germany; and died at Gena in Thuringia, in the year 1567, at 58 years of age according to Vossius, but some others say 80. Stifels was one of the best mathematicians of his time. He published, in the German language, a treatise on Algebra, and another on the Calendar or Ecclesiastical computation. But his chief work is the Arithmetica Integra, a complete and excellent treatise, in Latin, on Arithmetic and Algebra, printed in 4to. at Norimberg, 1544. In this work there are a number of ingenious inventions, both in common arithmetic and in algebra.

STIFF. *a.* (ꞅτiꝼ, Sax. *stiff*, Dan. *stijff*, Dut.) 1. Rigid; inflexible; resisting flexure; not flaccid; not limber; not pliant (*Milton*). 2. Not soft; not giving way; not fluid; not easily yielding to the touch (*Burnet*). 3. Strong; not easily resisted (*Denham*). 4. Hardy; stubborn; not easily subdued (*Shakspeare*). 5. Obstinate; pertinacious (*Taylor*). 6. Harsh; not written with ease (*Gondibert*). 7. Formal; rigorous in certain ceremonies; starched; affected (*Addison*).

To STI′FFEN. *v. a.* (ꞅτiꝼian, Saxon.) 1. To make stiff; to make inflexible; to make unpliant (*Sandys*). 2. To make torpid (*Dryden*).

To STI′FFEN. *v. n.* 1. To grow stiff; to grow rigid; to become unpliant (*Addison*). 2. To grow hard; to be hardened (*Dryden*). 3. To grow less susceptive of impression; to grow obstinate (*Dryden*).

STIFFHEA′RTED. *a.* (*stiff* and *heart*.) Obstinate; stubborn; contumacious (*Ezekiel*).

STIFFLE, the patella or knee-pan in a horse. A lameness in the stiffle is caused by those accidents that produce it in all other joints. When a horse is lame in this part he generally treads upon his toe, and cannot set that heel to the ground. Some strains in the stiffle are violent and swell pretty much, but Gibson asserts, that he hardly ever knew any of them incurable, unless bad methods had been used in the beginning. They commonly may be cured by cooling applications, such as have been prescribed for shoulder strains; but if the swelling be very large and puffy, which sometimes happens, recourse must be had to fomentations to take off inflammation. Sometimes, however, imposthumations follow in such cases, and when these break and run there is commonly an end of all danger.

STI′FFLY. *ad.* (from *stiff*.) Rigidly; inflexibly; stubbornly (*Hooker*).

STI′FFNECKED. *a.* (*stiff* and *neck*.) Stubborn; obstinate; contumacious (*Spenser*).

STI′FFNESS. *s.* (from *stiff*.) 1. Rigidity; inflexibility; hardness; ineptitude to bend (*L'Estrange*). 2. Ineptitude to motion; torpidness (*Denham*). 3. Tension; not laxity (*Dryden*). 4. Obstinacy; stubbornness; contumaciousness (*Locke*). 5. Unpleasing formality; constraint (*Atterb.*). 6. Rigorousness; harshness (*Spenser*). 7. Manner of writing not easy, but harsh and constrained (*Felton*).

To STI′FLE. *v. a.* (*estoufer*, French.) 1. To oppress or kill by closeness of air; to suffocate (*Baker*). 2. To keep in; to hinder from emission (*Newton*). 3. To extinguish by hindering communication: *the fire was* stifled. 4. To extinguish by artful or gentle means (*Addison*). 5. To suppress; to conceal (*Otway*).

STI′GMA. *s.* (*stigma*, Latin.) 1. A brand; a mark with a hot iron. 2. A mark of infamy.

STIGMA. A small red speck in the skin, occasioning no elevation of the cuticle. Stigmata are generally distinct or apart from each other. They sometimes assume a livid colour, and are then termed petechiæ.

STIGMA. (from στιζω, *inuro*, to brand or mark.) In botany, a stigma. Summitas pistilli madida humore pollen rumpendo; roridum, pubescens, supremum. Regn. Veg. The top of the pistil, pubescent and moist, in order to detain and burst the pollen or prolific powder. Grew named it the knob or button; and Withering the summit. I have sometimes asked myself, says professor Martin, how Linnéus came not to adopt the more elegant, classical term of fibula, which had been given to this part of the pistil by some authors who wrote before him.

The stigma differs in number, figure, and structure; being simple or divided, acute, perforated, capitate, peltate, or bilamellate.

STIGMA'TICAL. STIGMA'TIC. *a.* (from *stigma.*) Branded or marked with some token of infamy (*Shakspeare*).

To **STI'GMATIZE.** *v. a.* (*stigmatiser*, Fr.) To mark with a brand; to disgrace with a note of reproach (*Swift*).

STIGMATIZING, among the ancients, was inflicted upon slaves as a punishment, but more frequently as a mark to know them by; in which case it was done by applying a red-hot iron, marked with certain letters, forming the name or some peculiar character belonging to their masters, to their foreheads till a fair impression was made, and then pouring ink into the furrows, that the inscription might be the more conspicuous.

Soldiers were branded in the hand with the name or character of their general.

After the same manner it was customary to stigmatize the worshippers and votaries of some of the gods. The marks used on these occasions were various; sometimes they contained the name of the god, sometimes his particular ensign, as the thunderbolt of Jupiter, the trident of Neptune, the ivy of Bacchus, &c. or they marked themselves with some mystical number, whereby the god's name was described. To these three ways of stigmatizing St. John is supposed to refer. Rev. chap. xiii. ver. 16, 17. Theodoret is of opinion, that the Jews were forbidden to brand themselves with stigmata, because the idolaters, by that ceremony, used to consecrate themselves to their false gods.

STILAGO, in botany, a genus of the class dioecia, order triandria. Calyx one-leafed, caper-shaped; corolless. Male: filaments two or three on the germ. Fem.: stigma sessile; drupe with a one or two-celled nut. Two species; natives of the East Indies.

1. S. bunias. Triandrous; nut two-celled.
2. S. diandria. Diandrous; nut one-celled.

STILAR. *a.* (from *stile.*) Belonging to the stile of a dial (*Moxon*).

STILBE, in botany, a genus of the class polygamia, order dioecia. Hermaphrodite: outer calyx three-leaved, inner five-toothed; cartilaginous; corol funnel-form, four-cleft; stamens four; style one; seed one, invested with the inner calyx. Male: inner calyxless: fruitless. Three species; natives of the Cape.

STILBITE, in mineralogy, a species of zeolite. See ZEOLITHUS.

STILBUM, in botany, a genus of the class cryptogamia, order fungi. Fungus aggregate, gelatinous, stipitate; head diaphanous, shining, solid, permanent, bearing the seeds externally. Six species, all exotics.

STILE. *s.* (ꞅꞇıᵹele, from ꞅꞇıᵹan, Saxon; to climb.) 1. A set of steps to pass from one enclosure to another (*L'Estrange*). 2. (*stile*, French.) A pin to cast the shadow in a sundial (*Moxon*).

STI'LETTO. *s.* (Italian; *stilet*, French.) A small dagger, of which the blade is not edged but round, with a sharp point (*Hakewill*).

To **STILL.** *v. a.* (ꞅꞇıllan, Saxon; *stillen*, Dutch.) 1. To silence; to make silent (*Shakspeare*). 2. To quiet; to appease (*Bacon*). 3. To make motionless (*Woodward*).

STILL. *a.* (*stil*, Dutch.) 1. Silent; uttering no noise (*Addison*). 2. Quiet; calm (*South*). 3. Motionless (*Locke*).

STILL. *s.* Calm; silent (*Bacon*).

STILL. *ad.* (ꞅꞇılle, Saxon.) 1. To this time; till now (*Bacon*). 2. Nevertheless; notwithstanding (*Addison*). 3. In an increasing degree (*Alterbury*). 4. Always; ever; continually (*Ben Jonson*). 5. After that (*Whitgift*). 6. In continuance (*Shakspeare*).

STILL. *s.* (from *distil.*) A vessel for distillation; an alembic. See DISTILLATION.

To **STILL.** *v. a.* (from *distil.*) To distil; to extract, or operate upon, by distillation.

To **STILL.** *v. n.* (*stillo*, Latin.) To drop; to fall in drops: not in use (*Crashaw*).

STILLATI'TIOUS. *a.* (*stillatitius*, Lat.) Falling in drops; drawn by a still.

STI'LLATORY. *s.* (from *still* or *distil.*) 1. An alembic; a vessel in which distillation is performed (*Bacon*). 2. The room in which stills are placed; laboratory (*Wotton*).

STI'LLBORN. *a.* (*still* and *born.*) Born lifeless; dead in the birth (*Graunt*).

STI'LLICIDE. *s.* (*stillicidium*, Latin.) A succession of drops (*Bacon*).

STILLICI'DIOUS. *a.* (from *stillicide.*) Falling in drops (*Brown*).

STI'LLING. *s.* (from *still.*) 1. The act of stilling. 2. A stand for casks.

STILLINGFLEET (Edward), a learned English prelate, was born at Cranbourn, in Dorsetshire, in 1635. After an education at a private grammar-school, he was sent to St. John's college, Cambridge, of which he was chosen fellow in 1653. In 1657 he was presented to the rectory of Sutton, by sir Roger Burgoyne, with whom he lived in the greatest intimacy. In 1659 he published Irenicum, or a Weapon-Salve for the Church's Wounds. In 1662 appeared his great work, entitled Origines Sacræ, or a Rational Account of the Grounds of Natural and Revealed Religion; a work that has always been justly esteemed one of the best defences of Revelation ever written. He was soon after chosen preacher of the Rolls chapel, and in 1665 was presented to the rectory of St. Andrew's, Holborn. He was next chosen lecturer at the Temple, and appointed chaplain to the king. In 1670 he was made canon residentiary of St. Paul's, of which church he afterwards became dean. He greatly distinguished himself against James's design of introducing popery, and in 1689 was made bishop of Worcester. His works have been collected into 6 vols. folio. He died in 1699.

STILLINGFLEET (Benjamin), an eminent naturalist and poet, was grandson of the preceding, and the son of Edward Stillingfleet, a learned physician. He was educated at Norwich school, from whence he removed to Trinity-college, Cambridge, where he took the degree of B. A. He afterwards travelled into Italy, and on his return to England obtained the place of master of the barracks at Kensington. He died in 1771, aged 69. Mr. Stillingfleet wrote, 1. The Calendar of Flora, 1761. 2. Miscellaneous Travels, 1759, 8vo. 3. The Principles and Powers of Harmony, 4to. 1771. 4. Several Poems in Dodsley's Collection, &c. (*Watkins*).

STILLINGIA, in botany, a genus of the class monœcia, order monadelphia. Male: calyx hemispherical, many-flowered; corol tubular, lacerated. Fem.: calyx one-flowered, inferior; corol superior; style three-cleft; capsule three-grained. One species, S. sylvatica, a Carolina shrub, with erect milky stems; elliptic, serrulate leaves; terminal sessile spike; and yellow flowers.

STI′LLNESS. *s.* (from *still.*) 1. Calm; quiet; silence (*Dryden*). 2. Habitual silence; taciturnity (*Shakspeare*).

STI′LLSTAND. *s.* (*still* and *stand.*) Absence of motion (*Shakspeare*).

STI′LLY. *ad.* (from *still.*) 1. Silently; not loudly (*Shakspeare*). 2. Calmly; not tumultuously.

STILTON, a village in Huntingdonshire, lying on the great north road, between Huntingdon and Stamford, and at the distance of 75 miles from London. It gives name to a very celebrated kind of cheese, of which great quantities are sold at the Bell and Angel inns: this cheese, however, is not made at Stilton, nor near it, (except a small quantity at Yaxley), but in Leicestershire. See Cheese.

STILTS. *s.* (*stelten*, Dutch.) Supports on which boys raise themselves when they walk (*More*).

STIMULANTS. (*stimulantia, medicamenta*, from *stimulo*, to stir up.) Medicines are so termed which possess a power of exciting the animal energy. They are divided into, 1. Stimulantia tonica, as sinapi, cantharides, mercurii præparationes. 2. Stimulantia defusibilia, as alkali volatile, electricity, heat, &c. 3. Stimulantia cardiaca, as cinnamomum, nuxmoschata, wine, &c.

To STI′MULATE. *v. a.* (*stimulo*, Latin.) 1. To prick. 2. To prick forward; to excite by some pungent motive. 3. (In physic.) To excite a quick sensation, with a derivation toward the part (*Arbuthnot*).

STIMULA′TION. *s.* (*stimulatio*, Latin.) Excitement; pungency (*Watts*).

STIMULI. (*stigmuli*, from *στιγμος.*) In botany, stings.

In Philos. Bot. a species of pubescence; defined to be, punctura venenata quæ animalia nuda arcent. Exemplified in urtica or nettle, iatropha, acalypha, tragia. In Term. Bot. 393, they are separated from pubes, and enumerated with thorns and prickles, among arma, the defences of plants against animals. They are thus defined: mucrones puncturas inflammatorias efficientes, unde pruriginosæ evadunt partes. Processes or sharp points from a plant, producing inflammatory itching punctures. They are usually on the stem or leaf; which is then called urens, burning.

To STING. *v. a.* pret. *stung* or *stang*; part. pass. *stang* or *stung.* (ꞅꞇinᵹan, Saxon.) 1. To pierce or wound with a point darted out, as that of wasps or scorpions (*Brown*). 2. To pain acutely (*Shakspeare*).

Sting. *s.* (from the verb.) 1. A sharp point with which some animals are armed (*Drayton*). 2. Any thing that gives pain (*Forbes*). 3. The point in the last verse (*Dryden*). 4. Remorse of conscience.

Sting-ray, in ichthyology. See Raia.

STI′NGILY. *ad.* (from *stingy.*) Covetously.

STI′NGINESS. *s.* (from *stingy.*) Avarice; covetousness; niggardliness.

STI′NGLESS. *a.* (from *sting.*) Having no sting (*Decay of Piety*).

STI′NGO. *s.* Old beer.

STI′NGY. *a.* (a low cant word.) Covetous; niggardly; avaricious (*Arbuthnot*).

To STINK. *v. n.* preterit *stunk* or *stank.* (ꞅꞇinian, Saxon; *stincken*, Dutch.) To emit an offensive smell, commonly a smell of putrefaction (*Locke*).

Stink. *s.* Offensive smell (*Dryden*).

STI′NKARD. *s.* (from *stink.*) A mean stinking paltry fellow.

STI′NKER. *s.* (from *stink.*) Something intended to offend by the smell (*Harvey*).

STI′NKINGLY. *ad.* (from *stinking.*) With a stink (*Shakspeare*).

STINK-POT, an earthen jar or shell, charged with powder, grenadoes, and other materials of an offensive and suffocating smell. It is frequently used by privateers in the western ocean, in the attack of an enemy whom he designs to board; for which purpose it is furnished with a light fuse at the opening or touch-hole.

STINT, a species of the tringa.

To Stint. *v. a.* (*stynta*, Swedish.) To bound; to limit; to confine; to restrain; to stop (*Addison*).

Stint. *s.* (from the verb.) 1. Limit; bound; restraint (*Dryden*). 2. A proportion; a quantity assigned (*Swift*).

STIPA. Feather-grass. In botany, a genus of the class triandria, order digynia. Calyx two-valved, one-flowered; outer valve of the corol with a very long terminal awn, jointed at the base. Eleven species, chiefly natives of the south of Europe, the Cape, East or West Indies; one, common to our own mountains, S. pinna, with woolly awns: the plant rising to the height of ten inches, and flowering in July or August.

STIPE. Stipes. (*στύπος, a stake.*) In botany, basis frondis. Proprius palmis, filicibus, fungis. Truncus in folia transiens. Delin. Pl. A folio non distinctus. Regn. Veg. The base of a frond: or, a species of stem passing into leaves, or, not distinct from the leaf. The stem of a fungus is likewise called stipe: which Dr. Withering translates the pillar.

It is also put for the thread or slender stalk, which supports the pappus or down, and connects it with the seed. Filum elevans connectensque pappum & semen.

STI′PEND. *s.* (*stipendium*, Lat.) Wages; settled pay (*Ben Jonson*).

STIPE′NDIARY. *a.* (*stipendiarius*, Lat.)

Receiving salaries; performing any service for a stated price (*Swift*).

Stipe'ndiary. *s.* One who performs any service for a settled payment (*Abbot*).

STIPITATE, in botany, elevated on a stipe.

STI'PTIC. See Styptic.

To STI'PULATE. *v. a.* (*stipulor*, Latin.) To contract; to bargain; to settle terms (*Arbuthnot*).

STIPULA'TION. *s.* (from *stipulate.*) Bargain (*Rogers*).

STIPULA'TOR. *s.* One who contracts or bargains.

STIPULATE GLANDS, in botany, glands growing on stipules, or close to them.

Stipulate stem, a stipuled stalk. Having stipules on it.

STIPULE. (from *stipa*, which is from στυπη, tow.) In botany. Squama basi petiolorum enascentium adstans. A scale at the base of the nascent petioles; or peduncles, according to Philos. Bot. As in papilionaceæ, tamarindus, cassia, rosa, melianthus, liriodendron, apricot, peach, bird-cherry, &c. Some natural classes have no stipules; as the asperifoliæ, personatæ, verticillatæ, stellatæ, siliquosæ, liliaceæ, orchideæ, and most of the compositæ.

Stipules are:

1. In pairs; solitary; or none.
2. Lateral; extrafoliaceous; intrafoliaceous; oppositifolious.
3. Caducous; deciduous; permanent; spinescent.
4. Sessile; adnate; decurrent; sheathing.
5. Subulate; lanceolate; sagittate; lunate.
6. Erect; spreading; reflex.
7. Very entire; serrate; ciliate; toothed; cleft.
8. Very short; middling; long.

To STIR. *v. a.* (ꞅꞇıꞃıan, Saxon; *stooren*, Dutch.) 1. To move; to remove from its place (*Blackmore*). 2. To agitate; to bring into debate (*Hale*). 3. To incite; to instigate; to animate (*Shakspeare*). 4. To raise; to excite (*Dryden*). 5. *To* Stir *up*. To incite; to animate; to instigate by inflaming the passions (*Spenser*). 6. *To* Stir *up*. To put in action; to excite; to quicken (*Isaiah*).

To Stir. *v. n.* 1. To move one's self; to go out of the place; to change place (*Clarendon*). 2. To be in motion; not to be still (*Addison*). 3. To become the object of notice (*Watts*). 4. To rise in the morning (*Shakspeare*).

Stir. *s.* (*stur*, Runic, a battle.) 1. Tumult; bustle (*South*). 2. Commotion; public disturbance; tumultuous disorder; seditious uproar (*Milton*). 3. Agitation; conflicting passions (*Shakspeare*).

STIRIA, a duchy of Germany, in the circle of Austria, 125 miles long and 17 broad; bounded on the N. by Austria, E. by Hungary, S. by Carniola, and W. by Carinthia and Salzburg. It is divided into Upper and Lower Stiria: the former contains the circles of Judenburg and Bruck, and the latter those of Gratz, Marchburg, and Cilley. Though a mountainous country, there is much land fit for tillage, and the soil is fertile. The mountains are clothed with oak, beech, and pine; every kind of grain is well cultivated, and the white wine is very pleasant. It contains mines of excellent iron, whence the arms made here are in great esteem; also mines of lead and coal. The inhabitants are zealous worshippers of the virgin Mary. Gratz and Judenburg are the chief towns.

STI'RIOUS. *a.* (from *stiria*, Latin.) Resembling icicles.

STIRLING, a borough of Scotland, capital of Stirlingshire, seated on the river Forth, on a hill, which terminates abruptly in a steep basaltic rock. On this rock is an ancient castle, once a place of great strength, and often the scene of bloody contention. The palace, erected by James V. is a stately building; the outside curiously ornamented with grotesque figures. Here are two churches and a famous grammar school. In the town and its neighbourhood are manufactures of carpets, shaloons, and other woollen stuffs; and the cotton trade is very flourishing. A salmon fishery, belonging to the town, is let to a company, who send the fish chiefly to the London and Edinburgh markets. Stirling, from its commodious situation, commands the pass between the N. and S. part of Scotland. In 1801, the number of inhabitants was 5256. It is 30 miles N.W. of Edinburgh. Lon. 3. 45 W. Lat. 56. 6 N.

STIRLINGSHIRE, a county of Scotland, 35 miles long and 10 broad; bounded on the N. by Perthshire, N.E. by Clackmananshire and the frith of Forth, S.E. by Linlithgowshire, S. by Lanerkshire and Dumbartonshire, and W. by Dumbartonshire. It is divided into 22 parishes, and the number of inhabitants in 1801 was 50,825. The principal rivers are the Forth, Carron, and Avon; and the great canal crosses it from the mouth of the Carron. The S. part of the country is mountainous, but the part near the Forth is fertile. It abounds in coal, ironstone, and limestone.

STIRP. *s.* (*stirps*, Latin.) Race; family; generation: not used (*Bacon*).

STI'RRER. *s.* (from *stir.*) 1. One who is in motion; one who puts in motion. 2. A riser in the morning (*Shakspeare*). 3. An inciter; an instigator. 4. Stirrer *up*. An inciter; an instigator (*Raleigh*).

STIRRUP, a well-known iron frame, hung to a saddle by a strap of leather, for the rider to rest his foot on. For military exercises, the right stirrup should be kept half a point shorter than the left, for in combat the horseman bears more upon the right; and, to facilitate the mounting of your horse, the left stirrup should be longer than the other.

To STITCH. *v. a.* (*sticken*, Dutch.) 1. To sew; to work with a needle. 2. To join; to unite (*Wotton*). 3. *To* Stitch *up*. To mend what was rent (*Wiseman*).

To Stitch. *v. n.* To practise needlework.

Stitch. *s.* (from the verb.) 1. A pass of the needle and thread through any thing. 2. A sharp lancinating pain (*Harvey*). 3. A link of yarn in knitting (*Motteaux*).

STI′TCHERY. *s.* (from *stitch.*) Needlework: in contempt (*Shakspeare*).

STI′TCHWORT. *s.* Camomile (*Ains.*).

STI′THY. *s.* (ꞅꞇıð, hard, Sax.) An anvil; the iron body on which the smith forges his work (*Shakspeare*).

To **STIVE.** *v. a.* 1. To stuff up close (*Sandys*). 2. To make hot or sultry (*Wot.*).

STI′VER. *s.* (Dutch.) A Dutch coin about the value of a halfpenny.

STIZOLOBIUM. The cowage is sometimes so called. See Dolichos.

STOAT. (see Mustela.) A most mischievous little animal, very much resembling the weasel, and at a small distance, when running, not to be readily distinguished from it. Stoats abound near large farms surrounded with corn-ricks and faggot-piles, under which they ensure to themselves a never-failing protection. This diminutive pest, though but from two to three inches in height, ten inches long, the tail half the length of its body, disgustingly hairy, and pointed with black, the edges of the ears and the toes both of a cream-coloured white, is a most indefatigable, determined, and destructive enemy to game and poultry in all their branches.

STOBÆA, in botany, a genus of the class syngenesia, order polygamia æqualis. Receptacle bristly, cellular; down chaffy; corol floscular; calyx imbricate with tooth-spinous scales. Nine species; natives of the Cape.

STOBÆUS (Joannes), an old Greek writer of the fifth century. We have remaining by him a collection of extracts from ancient poets and philosophers; which, however, is not entire, but has been always highly valued by the learned. The best edition of his work was published at Paris in 1623, 4to.

STO′CAH. *s.* (Irish; *stochk,* Erse.) An attendant; a wallet-boy; one who runs at a horseman's foot: not in use (*Spenser*).

STOCCA′DO. *s.* (from *stocco*, a rapier, Italian.) A thrust with a rapier (*Shakspeare*).

STOCK. *s.* (ꞅꞇoc, Saxon; *stock*, Dutch.) 1. The trunk; the body of a plant (*Job*). 2. The trunk into which a graft is inserted (*Pope*). 3. A log; a post (*Prior*). 4. A man proverbially stupid (*Spenser*). 5. The handle of any thing. 6. A support of a ship while it is building (*Dryden*). 7. A thrust; a stoccado (*Sh.*). 8. Something made of linen; a cravat; a close neckcloth. Anciently a cover for the leg, now stocking (*Shakspeare*). 9. A race; a lineage; a family (*Denham*). 10. The principal; capital store; fund already provided (*Bacon*). 11. Quantity; store; body (*Arbuthnot*). 12. A fund established by the government, of which the value rises and falls by artifice or chance (*Pope*).

To Stock. *v. a.* (from the noun.) 1. To store; to fill sufficiently (*South*). 2. To lay in store. 3. To put in the stocks (*Shakspeare*). 4. *To* Stock *up*. To extirpate (*D. of Piety*).

Stock dove. See Columba.

Stock (Dwarf annual). See Cheiranthus.

Stock (Gilliflower). See Cheiranthus.

Stock (Ten weeks). See Cheiranthus.

Stock (Virgin). See Cheiranthus.

STOCKBRIDGE, a borough in Hampshire, with a market on Thursday, seated near the Test, nine miles N.W. of Winchester, and 66 W. by S. of London.

Stockbridge, a town of Massachusets, in Berkshire county, 44 miles W. by N. of Springfield.

STOCKHOLM, a city and capital of Sweden, situated on seven islands, between the Baltic and the Malar Lake, from one of which the city receives its name. The harbour is of sufficient depth to receive the largest vessels up to the quay. It is generally supposed to have been founded in the year 1252, or 1260, by Birgir Jarl, regent of the kingdom, though others date the foundation a century before; but the court was not removed from Upsal before the last century. At the extremity of the harbour several streets rise one above another, in the form of an amphitheatre, with the palace, a magnificent building, at the summit. Except in the suburbs, where are some houses of wood, the buildings for the most part are of stone, or of bricks stuccoed white, and most of them built on piles. A communication is formed between the several parts of Stockholm by means of twelve bridges. The royal academy of sciences at Stockholm owes its institution to Linnéus and a few other learned men, and was incorporated in the year 1741: the royal academy of painting and sculpture contains a fine collection of casts, from the antique statues at Rome, sent by Lewis XIV. to Charles XI. and presented by the late king Adolphus Frederic to the academy. The arsenal contains an immense number of standards and trophies, taken from the Imperialists, Poles, Russians, and Danes. A national bank was established at Stockholm towards the close of the last century. In Stockholm are manufactures of glass, china, woollen, silk, linen, &c. The number of inhabitants is estimated at 60,000. Lon. 18. 9 E. Lat. 59. 20 N.

STOCKING, that part of the clothing of the leg and foot which immediately covers and screens them from the rigour of the cold. Anciently, the only stockings in use were made of cloth, or of milled stuffs sewed together; but since the invention of knitting and weaving stockings of silk, wool, cotton, thread, &c. the use of cloth stockings is quite discontinued. Dr. Howel, in his History of the World (vol. ii. p. 222), relates, that queen Elizabeth, in 1501, was presented with a pair of black knit silk stockings by her silk-woman, and thenceforth she never wore cloth ones any more. The same author adds, that king Henry VIII. ordinarily wore cloth hose, except there came from Spain, by great chance, a pair of silk stockings. His son, king Edward VI. was presented with a pair of long Spanish silk stockings by sir Thomas Gresham, and the present was then much taken notice of. Hence it should seem, that the invention of knit silk stockings originally came from Spain. Others relate, that one William Rider, an apprentice on London-bridge, seeing at the house of an Italian merchant a pair of knit worsted stockings from Mantua, took the hint, and made a pair exactly like them, which he presented to William earl of Pembroke, and that they were the first of that kind worn in England, anno 1564.

The modern stockings, whether woven or knit, are formed of an infinite number of little knots, called stitches, loops, or meshes, intermingled in one another.

Knit stockings are wrought with needles made of polished iron, or brass wire, which interweave the threads, and form the meshes the stocking consists of. At what time the art of knitting was invented, it is perhaps impossible to determine, though it has been usually attributed to the Scots, as it is said that the first works of this kind came from Scotland. It is added, that it was on this account that the company of stocking-knitters, established at Paris, 1527, took for their patron St. Fiacre, who is said to have been the son of a king of Scotland. But it is most probable that the method of knitting stockings by wires or needles was first brought from Spain.

Woven stockings are generally very fine; they are manufactured on a frame or machine made of polished iron, the structure of which it is needless to describe, as it may be seen in almost every considerable town in Great Britain. The invention of this machine is by Mr. Anderson attributed to William Lee, M. A. of St. John's College, Cambridge, at a period so early as 1589. Others have given the credit of this invention to a student of Oxford at a much later period, who, it is said by Aaron Hill, was driven to it by dire necessity. This young man, falling in love with an inn-keeper's daughter, married her though she had not a penny, and he by his marriage lost a fellowship. They soon fell into extreme poverty; and their marriage producing the consequences naturally to be expected from it, the amorous pair became miserable, not so much on account of their sufferings, as from the melancholy dread of what would become of their yet unborn infant. Their only means of support were the knitting of stockings, at which the woman was very expert: "But sitting constantly together from morning to night, and the scholar often fixing his eyes, with stedfast observation, on the motion of his wife's fingers in the dexterous management of her needles, he took it into his imagination, that it was not impossible to contrive a little loom which might do the work with much more expedition. This thought he communicated to his wife, and joining his head to her hands, the endeavour succeeded to their wish. Thus the ingenious stocking-loom, which is so common now, was first invented; by which he did not only make himself and his family happy, but has left his nation indebted to him for a benefit which enables us to export silk stockings in great quantities, and to a vast advantage, to those very countries from whence before we used to bring them at considerable loss in the balance of our traffic."

Stocking, a cruel folly prevalent among cow-jobbers. In stocking the cows, as it is called, they oblige these creatures to suffer the pains of retention, twenty-four or perhaps forty-eight hours, previous to sale, that they may have a great shew of milk in the udder. All buyers of cows however, that know any thing of cattle, are aware of the custom, and of consequence avoid the deception. "The plea that any knowledge of the animal can be thence obtained," says Mr. Lawrence, "is ridiculous; for there are other rules of judging infinitely more certain, familiar to every experienced man. Many cows get inflamed and even indurated udders from this practice, from which they never perfectly recover."

To Sto'cking. *v. a.* (from the noun.) To dress in stockings (*Dryden*).

STO'CKJOBBER. *s.* (*stock* and *job.*) A low wretch who gets money by buying and selling shares in the funds (*Swift*).

STO'CKISH. *a.* (from *stock.*) Hard; blockish (*Shakspeare*).

STO'CKLOCK. *s.* (*stock* and *lock.*) Lock fixed in wood (*Moxon*).

STOCKPORT, a town in Cheshire, with a market on Friday. It has a considerable manufacture of cotton and printed goods, and is seated on the Mersey, six miles S.S.E. of Manchester, and 176 N.N.W. of London. In 1801 the number of inhabitants was 14,830. It has two churches, several meeting-houses, and the largest rooms for Sunday-schools in the kingdom; they are capable of receiving 4 or 5000 children.

STOCKS, among ship-carpenters, a frame of timber, and great posts made ashore, to build pinnaces, ketches, boats, and such small craft, and sometimes small frigates. Hence we say, a ship is on the stocks, when she is a building.

Stocks, a wooden machine to put the legs of offenders in, for the securing of disorderly persons, and by the way of punishment in divers cases, ordained by statute, &c. And it is said, that every vill, within the precinct of a town, is indictable for not having a pair of stocks, and shall forfeit five pounds.

Stocks (Public). See Funds.

STOCKSTILL. *a.* Motionless as logs (*Ad.*).

STOCKTON, a town in the county of Durham, with a market on Wednesday. It has a large manufacture of sailcloth, a trade in lead, corn, and butter, and is noted for its good ale. It is seated on the river Tees, not far from its mouth, 18 miles S.S.E. of Durham, and 244 N. by W. of London. Lon. 1. 6 W. Lat. 54. 38 N.

STOEBE, in botany, a genus of the class syngenesia, order polygamia segregata. Calyx imbricate; calycle five-leaved, one-flowered; florets tubular, all hermaphrodite; receptacle naked; down feathery. Twenty species, thus subdivided:

A. Leaves mucronate; flowers in clustered heads.

B. Leaves mucronate; flowers in clustered spikes.

C. Leaves not mucronate or pungent.

All natives of the Cape.

STOECHAS. (ϛοιχας; from ϛοιχαδες, the islands on which it grew.) French lavender.

STOECHAS ARABICA. French lavender. Lavendula stæchas of Linnéus. This plant is much less grateful in smell and flavour than the common lavender, to which it is allied in its properties.

STOECHAS CITRINA. See ELICHRYSUM.

STOICISM, the doctrines and opinions, or conduct of the stoics, or followers of Zeno.

STOICS, a sect of ancient philosophers, the followers of Zeno; thus called from the Greek ϛοα, portico, because Zeno used to teach under a portico, or piazza.

The author of this sect, Zeno, was of Cittium, a town of Cyprus, inhabited by a colony of Phœnicians, whence he is supposed to have borrowed many of his dogmata from Phœnician philosophy, which many learned men maintain was, itself, borrowed from the Jewish: though it must be allowed, there appear as many things in the stoic philosophy, borrowed from Plato's and Socrates's school, as from that of Moses.

Zeno making a trading voyage from Cittium to Athens, richly freighted with Tyrian purple, was shipwrecked not far from port; upon which, we are told, consulting the oracle how he should best spend the rest of his life, he was answered, ει ζυγχρωτιζοιτο τοις νεκοις, "by becoming of the same colour with the dead;" upon which he applied himself to the study of the ancient philosophers, and became a hearer of Crates, the Cynic. But Laertius tells us, he had too much natural modesty to suffer him to give into the Cynic impudence.

From Crates he had recourse to Stilpon and Xenocrates, then to Diodorus Cronus and Polemon, and at length began to think of instituting a new sect. To this purpose a ϛοα, portico, called from the pictures of Polygnotus therein the painted portico, was pitched on.

Here, using to walk and philosophize, he was soon attended by a great number of disciples, hence called Στωικοι, Stoici.

He became exceedingly reverenced at Athens, for the probity and severity of his life and manners, and the consistency thereof with his doctrine; insomuch that the Athenians decreed him, when living, a golden crown, and used in dubious times to deposit the keys of the city with him; and, after his death, they consecrated an altar to him.

One of his chief followers was Cleanthes, who was succeeded by Chrysippus, and he by Diogenes Babylonius, Antipater, Panætius, and Posidonius, among the Greeks; and by Cato, Varro, Cicero, Seneca, the emperor Antoninus, &c. among the Romans; and by Pantenus and Clemens Alexandrinus, among the Christians. And the chief restorers of the stoic philosophy among the moderns were Justus Lipsius, Scioppius, Heinsius, and Gataker. The Stoics cultivated logics, physics, metaphysics, &c. but chiefly ethics. The principal of the dogmata of the former kinds are as follows:

That there are certain καταχηψεις, comprehensions (which others call κοιναι εννοιαι, common notices, or innate ideas, or principles, and Cicero, *inchoatæ intelligentiæ*, beginnings of understanding), naturally found in the mind: that God is the seminal cause of the universe; that the world is an animal; which opinion the Stoics maintained in common with the Platonists, by reason of God's inhabiting and informing every part thereof, in quality of an *anima mundi:* that nature is an artificial fire, tending to generation; and that the world is to be destroyed at last by a conflagration.

As for the morality of the Stoics, it was couched much in paradoxes: as, that a wise man is void of all passion or perturbation of mind: that pain is no real evil; but that a wise man is happy in the midst of the severest torture: that a wise man is always the same, and always joyful: that none but a wise man is free; all others are slaves: that none but a wise man is rich: that none but a wise man ought to be esteemed a king, magistrate, poet, or philosopher: that all wise men are great: that all things are a wise man's, who is contented with himself: that wise men are the only friends, and the only lovers: that nothing ever happens to a wise man beyond expectation: that all virtues are inviolably connected together: that all good things are equal, and equally to be desired; and that goodness admits of no increase or diminution.

Whether virtue might be lost or no, was warmly disputed among them. Chrysippus held it might, and by drunkenness and atra bilis; Cleanthes that it could not, by reason of the firmness of the καταληψεις, comprehensions.

They owned but one God, whom, however, they called by various names, as Mind, Fate, Jupiter, &c. by which they did not mean various things; but various powers and relations of the same things. Providence they expressed under the name of Fate, which Chrysippus defines to be a natural series or composition of things mutually following each other by an immutable nexus, or tie, fixed from all eternity; and which some have supposed to be different from what is now called absolute fatality, and not altogether inconsistent with free agency. Lastly, they held that the human soul survived the body.

For a fuller account of the opinions of the Stoics, see Budæus in his excellent Hist. Philos. cap. iv. § 36—40, and Lips. Manuduct. ad Phil. Stoicam prœsertius, lib. i. cap. 14, 15.

STOKE, STOAK, seem to come from the Saxon ꞅtocce, the stock or body of a tree (*Gibson*).

STOKE, is the name given to many villages in different parts of the kingdom, as in Norfolk, Suffolk, Dorsetshire, Buckinghamshire.

STOKESIA, in botany, a genus of the class syngenesia, order polygamia æqualis. Receptacle naked; down of four bristles; calyx foliaceous, somewhat imbricate; corol radiate; corollets of the ray funnel-form, irregular. One species only, S. cyanea, a herb of Carolina.

STOKESLEY, a town in the N. riding of

Yorkshire, with a market on Saturday, 36 miles N. of York, and 239 N. by W. of London. Lon. 1. 2 W. Lat. 54. 29 N.

STOLBERG, a town of Upper Saxony, in Thuringia, capital of a county of the same name, with a castle, where the count resides. It is seated in a valley between two mountains, 10 miles N. of Nordhausen, and 58 N.W. of Leipsick. Lon. 11. 8 E. Lat. 51. 42 N.

STOLE, Stola, from ϛολη, signifying a long robe, or vestment, a sacerdotal ornament, worn by the Romish parish-priests over their surplice, as a mark of superiority in their respective churches.

The stole is worn by other priests over the alb, at celebrating of mass; in which case it goes across the stomach; and by deacons over the left shoulder, scarf-wise.

The stola is a broad swath, or slip of cloth or stuff, hanging from the neck to the feet, with three crosses thereon. The bishops anciently pretended, that the parish-priests were never to appear before them but in their stoles. In Flanders and Italy they always preach in stoles. It is supposed to be a representation of the borders of the long robe worn by the Jewish high-priests.

The stola of the ancient Romans, &c. was very different from that now in use; the former was a kind of robe fitter for women than men, though it was held a robe of honour among all nations. Kings themselves sometimes used it, and sometimes bestowed it as a reward of virtue.

Stole (Groom of the), the eldest lord of his majesty's bed-chamber, whose office and honour it is to present and put on his majesty's first garment or shirt every morning; and to order the things in the chamber.

Stole. The preterit of *steal.*

STO'LEN. The participle passive of *steal.*

STOLHOFFEN, a town of Suabia, in the marquisate of Baden, seated in a morass, near the Rhine, eight miles S.W. of Baden, and 12 N.E. of Strasburg. Lon. 8. 10 E. Lat. 48. 41 N.

STOLI'DITY. *s.* (*stolidité*, French.) Stupidity; want of sense (*Bentley*).

STOLO, in botany, a sucker from the root. See Sucker.

STOLONIFEROUS STEM. Stoloniferus caulis. Putting forth suckers.

STOLPEN, a town of Upper Saxony, in Prussian Pomerania, seated in a valley, on a river of the same name, 50 miles NE. of Colberg, and 66 N.W. of Dantzic. Lon. 16. 45 E. Lat. 54. 32 N.

STOMACA'CE. (ϛομακακη; from ϛομα, the mouth, and κακος, evil). A fetor in the mouth with a bloody discharge from the gums.

STOMACH. Ventriculus. A membranous receptacle, situated in the epigastric region, which receives the food from the œsophagus: its figure is somewhat oblong and round; it is largest on the left side, and gradually diminishes towards its lower orifice, where it is the least. Its superior orifice, where the œsophagus terminates, is called the cardia; the inferior orifice, where the intestine begins, the pylorus. The anterior surface is turned towards the abdominal muscles, and the posterior opposite the lumbar vertebræ. It has two curvatures: the first is called the great curvature of the stomach, and extends downwards from one orifice to the other, having the omentum adhering to it; the second is the small curvature, which is also between both orifices, but superiorly and posteriorly. The stomach, like the intestinal canal, is composed of three coats or membranes: 1. The outermost, which is very firm from the peritonæum: 2. The muscular, which is very thick, and composed of various muscular fibres: and, 3. The innermost or villous coat, which is covered with exhaling and inhaling vessels, and mucus. These coats are connected together by cellular membrane. The glands of the stomach which separate the mucus are situated between the villous and muscular coat, in the cellular structure. The arteries of the stomach come chiefly from the cœliac artery, and are distinguished into the coronary, gastro-epiploic, and short arteries; they are accompanied by veins which have similar names, and which terminate in the vena portæ. The nerves of the stomach are very numerous, and come from the eighth pair and intercostal nerves. The lymphatic vessels are distributed throughout the whole substance, and proceed immediately to the thoracic duct. The use of the stomach is to excite hunger and partly thirst, to receive the food from the œsophagus, and to retain it, till by the motion of the stomach, the admixture of various fluids, and many other changes, it is rendered fit to pass the right orifice of the stomach, and afford chyle to the intestines.

Stomach (Inflammation of the). See Gastritis.

Stomach, signifies farther. 1. Appetite; desire of food (*Hammond*). 2. Inclination; liking (*L'Estrange*). 3. Anger; violence of temper (*Butler*). 4. Sullenness; resentment (*Hooker*). 5. Pride; haughtiness (*Shaks.*).

To Sto'mach. *v. a.* (*stomacher*, Latin.) To resent; to remember with anger and malignity (*L'Estrange*).

To Sto'mach. *v. n.* To be angry (*Hooker*).

STO'MACHED. *a.* (from *stomach.*) Filled with passions of resentment (*Shakspeare*).

STO'MACHER. *s.* (from *stomach.*) An ornamental covering worn by women on the breast (*Donne*).

STO'MACHFUL. *a.* (*stomach* and *full.*) Sullen; stubborn; perverse (*Locke*).

STO'MACHFULNESS. *s.* Stubbornness; sullenness; obstinacy.

STOMA'CHICAL. Stoma'chic. *a.* (*stomachique*, French.) Relating to the stomach (*Harvey. Floyer*).

STOMACHICS. (*stomachia, medicamenta*, from ϛομαχος, the stomach.) Medicines which excite and strengthen the action of the stomach.

STO'MACHLESS. *a.* (*stomach* and *less.*) Being without appetite.

STO'MACHOUS. *a.* (*stomachosus*, Latin.) Stout; angry; sullen; obstinate (*Spenser*).

STOMATEUS, in zoology, a genus of the class pisces, order apodalia. Head compressed; teeth both in the jaws and palate; body oval, broad, slippery; tail forked. Three species, as follow:

1. S. fiatola. Body partly barred with great beauty: inhabits the Mediterranean and Red Seas; and has two stomachs.

2. S. para. Back gold-colour; belly silvery. Inhabits South America and Tranquebar; feeds on smaller fishes and worms; body slender, covered with small, thin, deciduous scales; flesh white, tender, delicious.

3. S. cumara. Back blue; belly white. Inhabits the fresh waters of Chili; is about a span long, and not crossed with stripes.

STOMOXYS, in zoology, a genus of the class insecta, order diptera. Sucker with a single-valved sheath, inclosing bristles each in its proper sheath; feelers two, short, setaceous, of five articulations; antennas setaceous. Sixteen species; chiefly natives of Europe, a few of America, and one or two of Barbary: three common to our own country. They are thus subdivided.

A. Sheath convolute and geniculate at the base, with two bristles.

B. Sheath covering the mouth, with five bristles. This division however includes only three species, and constitutes the tribe rhingia of Fabricius.

They all suck blood from other animals. The following may serve as examples:

1. S. calcitrans. Antennas slightly feathered; grey, with black legs. Inhabits Europe; resembles the common fly, and is the insect which buzzes about the legs of cattle, making them continually stamp with the feet; and which stings our own legs in autumn.

2. S. irritans. Cinereous, slightly hairy; abdomen spotted with black. Inhabits Europe, and is very troublesome on the back of cattle.

3. S. rostrata. Thorax with obscure lines; proboscis, abdomen, and legs testaceous; wings pale. Inhabits Europe, and like both the preceding, found common in our own country; resembles the common fly, and is very troublesome to cattle.

STOND. *s.* (for *stand.*) 1. Post; station: obsolete (*Spenser*). 2. Stop; indisposition to proceed (*Bacon*).

STONE. *s.* (ꞅꞇan, Saxon; *steen*, Dutch.) 1. Stones are bodies insipid, hard, not ductile, or malleable, not soluble in water (*Woodward*). 2. Piece of stone cut for building (*Zech.*) 3. Gem; precious stone (*Shakspeare*). 4. Any thing made of stone (*Shakspeare*). 5. Calculous concretion in the kidneys or bladder; the disease arising from a calculus (*Temple*). 6. The case which in some fruits contains the seed (*Bacon*). 7. Testicle. 8. A funeral monument (*Pope*). 9. It is taken for a state of torpidness and insensibility (*Pope*). 10. STONE is used by way of exaggeration; as, stone *still*, stone *dead* (*Shakspeare. Hudi.*). 11. *To leave no* STONE *unturned.* To do every thing that can be done (*Dryden*).

STONE. *a.* Made of stone (*Shakspeare*).

To STONE. *v. a.* (from the noun.) 1. To pelt, beat, or kill with stones (*Exodus*). 2. To harden (*Shakspeare*).

STONES, in mineralogy, is a term that has been very differently made use of by different writers and theorists. It has often been employed synonymously with rocks, to signify an entire class or order of those indurated substances which enter into the mass of the earth's solid surface; and in this case the term has been sometimes put on a parallel with salts, inflammables, and metals; and at other times with minerals and fossils, which last arrangement constitutes the Linnéan method of 1736 and 1748. It has occasionally been united with the term earths, to constitute an entire order, as in the system of Schmeisser of 1795, the genera being zircon, adamantine spar, siliceous, argillaceous, magnesian, calcareous, barytic, strontian, and (which, however, has since been found to be a variety of strontian) sydneya. It has in other classifications been entered as a mere genus in some order of the class rocks, as in the Linnéan method of 1768, in which the three classes are rocks, minerals, and fossils; the first comprehending the four orders of humous, calcareous, argillaceous, and aggregate; the term stones occurring as the only genus under this last order. The term, however, has been more generally banished altogether of late years from the mineralogical vocabulary, as unnecessary and indefinite.

Correctly speaking, however, it has usually been employed both in common acceptation and in all the preceding systems to import that class of indurated substances which in the Wernerian method is distinguished by the name of earthy fossils, and which include the eight following genera; diamond, zircon, flint, clay, talc, calc, baryte, and strontian. It is necessary, however, to observe, that these generic names are employed, not as the words siliceous, argillaceous, &c. were formerly, to intimate that the minerals comprehended under them contain a preponderating quantity of the earth which gives rise to the name, but merely as offering a reference to the most striking and characteristic external characters of the genus. Thus all the species belonging to the flint genus possess, in an eminent degree, the properties that in common life are termed flinty, and can readily be arranged around quartz or flint as a central point: although, contemplated in regard to their chemical or constituent elements, there are several of them that contain no silica or flinty matter whatever; as in the clay genus there are also several that contain no alumina or proper clay. The terms talc and calc are preferred to talcareous and calcareous, as offering more orthographic uniformity, and a greater readiness of utterance. Zircon has a considerable resemblance to the flint genus, but as it cannot follow it, agreeably to the general rules laid down in this system, it is made to precede it, and is hence placed immediately before it. There is a still greater difficulty respecting the very extraordinary substance which we call diamond. This, by the ancients, was placed, as it stands in the present system, among the earthy minerals, and regarded as the first of precious stones; but in later times it has been discovered to be a combustible body, which no other stones of any kind are, and to consist very nearly of carbon or pure charcoal; and hence, in chemistry, it has, with the greatest propriety, been arranged under the division of inflammables. Nor are there wanting some mineralogists who have adopted a similar arrangement. By M. Werner, however, it is regarded not only as a mineral stone, but as the most perfect of the entire class, and hence, although containing no earth whatever, properly so called, he has placed it at the head of the earthy minerals or fossils. His reasons are as follows: 1. It agrees in many of its external characters with zircon; it must hence be placed near it, and (not to interrupt the arrangement) before it, for the very reason that zircon is placed before flint. 2. When compared with other inflammables it presents many striking differences: thus inflammable minerals of every other kind are light, soft, generally dark coloured, easily inflamed, and not crystallized; the diamond, on the contrary, exhibits the most beautiful and brilliant colours, is almost always crystallized, has considerable specific gravity, and, of all minerals, possesses the greatest degree of hardness.

For the subdivisions of the eight genera of stones or earthy fossils here enumerated, we refer to the article MINERALOGY, which, under class I, as arranged by professor Jameson, contains all those substances which ought to be denominated stones, whether in a scientific or popular sense of the term.

STONE (Edmund), a good Scotch mathematician, who was author of several ingenious works. We know not the particular place or date of his birth, but it was probably in the shire of Argyle, and about the beginning of the last century, or conclusion of the 17th. Nor have we any memoirs of his life, except a letter from the chevalier de Ramsay, author of the Travels of Cyrus, in a letter to father Castel, a jesuit at Paris, and published in the Memoires de Trevoux, p. 109, as follows: "True genius overcomes all the disadvantages of birth, fortune, and education; of which Mr. Stone is a rare example. Born a son of a gardener of the duke of Argyle, he arrived at eight years of age before he learnt to read. By chance a servant having taught young Stone the letters of the alphabet, there needed nothing more to discover and expand his genius. He applied himself to study, and he arrived at the knowledge of the most sublime geometry and analysis, without a master, without a conductor, without any other guide than pure genius.

"At 18 years of age he had made these considerable advances without being known, and without knowing himself the prodigies of his acquisitions. The duke of Argyle, who joined to his military talents a general knowledge of every science that adorns the mind of a man of his rank, walking one day in his garden, saw lying on the grass a Latin copy of sir Isaac Newton's celebrated Principia. He called some one to him to take and carry it back to his library. Our young gardener told him that the book belonged to him. 'To you?' replied the duke. 'Do you understand geometry, Latin, Newton?' 'I know a little of them,' replied the young man with an air of simplicity arising from a profound ignorance of his own knowledge and talents. The duke was surprised; and having a taste for the sciences, he entered into conversation with the young mathematician: he asked him several questions, and was astonished at the force, the accuracy, and the candour of his answers. 'But how,' said the duke, 'came you by the knowledge of all these things?' Stone replied, 'a servant taught me, ten years since, to read: does one need to know any thing more than the 24 letters in order to learn every thing else that one wishes?' The duke's curiosity redoubled—he sat down upon a bank, and requested a detail of all his proceedings in becoming so learned.

"'I first learned to read,' said Stone: 'the masons were then at work upon your house: I went near them one day, and I saw that the architect used a rule, compasses, and that he made calculations. I enquired what might be the meaning of and use of these things; and I was informed that there was a science called arithmetic: I purchased a book of arithmetic, and I learned it.—I was told there was another science called geometry: I bought the books, and I learned geometry. By reading I found that there were good books in these two sciences in Latin: I bought a dictionary, and I learned Latin. I understood also that there were good books of the same kind in French: I bought a dictionary, and I learned French. And this, my lord, is what I have done: it seems to me that we may learn every thing when we know the 24 letters of the alphabet.'

"This account charmed the duke. He drew this wonderful genius out of his obscurity; and he provided him with an employment which left him plenty of time to apply himself to the sciences. He discovered in him also the same genius for music, for painting, for architecture, for all the sciences which depend on calculations and proportions.

"I have seen Mr. Stone. He is a man of great simplicity. He is at present sensible of his own knowledge: but he is not puffed up with it. He is possessed with a pure and disinterested love for the mathematics; though he is not solicitous to pass for a mathematician; vanity having no part in the great labour he sustains to excel in that science. He despises fortune also; and he has solicited me twenty times to request the duke to give him less employment, which may not be worth the half of that he now has, in order to be more retired, and less taken off from his favourite studies. He discovers sometimes, by methods of his own, truths which others have discovered before him. He is charmed to find on these occasions that he is not a first inventor, and that others have made a greater progress than he thought. Far from being a plagiary, he attributes ingenious solutions, which he gives to certain problems, to the hints he has found in others, although the connection is but very distant," &c.

Mr. Stone was author and translator of several useful works; viz. 1. A New Mathematical Dictionary, in 1 vol. 8vo. first printed in 1726. 2. Fluxions, in 1 vol. 8vo. 1730. The Direct Method is a translation from the French of Hospital's Analyse des Infiniments Petits; and the Inverse Method was supplied by Stone himself. 3. The Elements of Euclid, in 2 vols. 8vo. 1731. A neat and useful edition of those Elements, with an account of the life and writings of Euclid, and a defence of his elements against modern objectors. Beside other smaller works.

Stone was a fellow of the Royal Society, and had inserted in the Philosophical Transactions (vol. 41, p. 218) an account of two species of lines of the third order, not mentioned by sir Isaac Newton, or Mr. Stirling.

Stone denotes a certain quantity or weight of some commodities. A stone of beef, at London, is the quantity of eight pounds; in Herefordshire, twelve pounds; in the north, sixteen pounds. A stone of wool (according to the statute of 11 Henry VII.) is to weigh fourteen pounds; yet in some places it is more, in others less: as in Gloucestershire, fifteen pounds; in Herefordshire, twelve pounds. A stone, among horse-coursers, is the weight of fourteen pounds.

Stone, in medicine. See Calculus.

Stone butter, in mineralogy, a species of alum. See Alumen.

Stones from the clouds. See Aeroliths.

Stone coal, in mineralogy. See Bitumen.

STONECROP, in botany. See Sedum.

Stonecrop tree, in botany. See Chenopodium.

STONECROSS. See Illecebra.

STONE-CHAT, in ornithology. See Motacilla.

STONE-LILY, in the mineralogical class of petrifactions. See Helmintholithus.

STONEHENGE, or **Stone-heng**, in antiquity, a famed pile or monument of huge stones on Salisbury Plain, six miles distant from that city.

It is described by Mr. Camden to be a huge and monstrous piece of work, such as Cicero termeth *insanam substructionem*. For within the circuit of the ditch, he says, there are erected, in manner of a crown, in three ranks or courses, one within another, certain mighty and unwrought stones, whereof some are 28 feet high, and seven feet broad; upon the heads of which others, like overthwart pieces, do bear and rest cross-wise, with small tenons and mortises, so that the whole frame seemeth to hang: on which account we call it Stone-heng, as our old historians termed it, because of its magnitude, *chorea gigantum*, the giants dance. The perpendicular stones are called corse-stones, and the overthwart ones are called cronets. This antiquity, says Mr. Inigo Jones, because the architraves are set upon the heads of the upright stones, and hang, as it were, in the air, is generally known by the name of Stone-heng. The whole work, in general, being of a circular form, is a hundred and ten feet in diameter; double winged about, without a roof; anciently environed with a deep trench, still appearing about thirty feet broad: so that betwixt it and the work itself, a large and void space of ground being left, it had from the plain three open entrances, the most conspicuous of which lies north-east; at each of which was raised, on the outside of the trench, two huge stones, gate-wise; parallel to which, on the inside, are two others, of less proportion. The inner part of the work, consisting of an hexagonal figure, was raised, by due symmetry, upon the bases of four equilateral triangles, which formed the whole structure. This inner part was likewise double, having within it also another hexagon raised; and all that part within the trench, situated upon a commanding ground, eminent and much higher than the surrounding plain; in the midst of which, upon a foundation of hard chalk, the work itself was placed; insomuch that, from whatsoever part they came into it, they rose by a hill of easy ascent. In the inmost part of the work is a stone, appearing not much above the surface of the earth, and lying towards the east, four feet broad, and sixteen feet long; which, whether it be an altar or no, this author refers to the judgment of others. The great stones, which made the entrances from the outside of the trench, are seven feet broad, three feet thick, and twenty feet high. The parallel stones on the inside of the trench are four feet broad, and three feet thick; but they are so broken, that their proportions in height cannot be exactly measured. The stones which make the outward circle are seven feet broad, three feet and a half thick, and fifteen feet and a half high; each stone having two tenons mortised into the architrave continuing upon them, throughout the whole circumference. For these architraves being jointed exactly in the middle of each of the perpendicular stones, that their weight might have an equal bearing; and upon each side of the joint a tendon wrought (as remains yet to be seen) it may hence positively be concluded, that the architrave is continued round about this outward circle. The smaller stones of the inner circle are one foot and a half broad, one foot thick, and six feet high. These had no architrave upon them, but were raised perpendicular, of a pyramidal form. The stones of the greater hexagon are seven feet and a half broad, three feet and three-quarters thick, and twenty feet high, each stone having one tenon in the middle. The stones of the inner hexagon are two feet and a half broad, one foot and a half thick, and eight feet high, in form pyramidal, like those of the inner circle. The architrave lying round about upon the perpendicular stones of the outward circle is three feet and a half broad, and two feet and a half high. The architrave on the top of the great stones of the outward hexagon is sixteen feet long, 3¾ feet broad, and 3⅓ feet high. This architrave, continuing only from stone to stone, left betwixt every two and two a void space free to the air, uncovered. The vulgar have thought it ominous, and indeed absolutely impossible, to count the number of stones composing this ancient monument. To this legendary tale Sydney refers in his sonnet of the wonders of England, when he says,

Near Wilton sweet, huge heaps of stone are found,
But so confused, that neither any eye
Can count them just, nor reason reason try,
What force brought them to so unlikely ground.

In reference to this absurd superstition, Mr. Jones says, that if any one will observe the orders of the circles as they now appear, without passing from one to another confusedly, and note where he begins, he may easily find the number. Dr. Stukely computes them in the following manner: "the great oval," he says, "consists of ten uprights; the inner, with the altar, of twenty; the great circle of thirty; the inner of forty; which are a hundred upright stones; five imposts of the great oval; thirty of the great circle; the two stones on the bank of the area, the stone lying within its entrance, and that standing without; and another on the ground directly opposite to the entrance of the avenue; so that the whole number is a hundred and forty." This writer observes, that, according to the intention of the founders, the whole circle of this work was to consist of thirty stones, each stone to be four cubits (a cubit being 20⅘ inches English measure) broad, each interval two cubits; 30 times 4 cubits will give twice 60, and 30 times 2 cubits 60; and, therefore, thrice 60 cubits complete a circle, whose diameter is 60. A stone, 4 cubits broad, and 2 thick, is double the interval, which is a square of 2 cubits.

Antiquaries are divided as to the origin, use, structure, &c. of this wonderful fabric. Some of them take the stones to be artificial, and to have been made on the spot; arguing, that the ancients had the art of making stones with sand and a strong lime or cement; and as the stones seem too big for land carriage, and yet are in a plain, which for some miles round scarce affords any stones at all. Inigo Jones, however, a better judge than most antiquaries, is positive that the stones are all natural; and there is hardly any architect or naturalist who examines the grain of them exactly but will be of his mind. As to their unwieldiness, which is brought as an argument against their being portable, it is without foundation; they being really but trifles compared to many other stones which are known to have been thus carried.

Mr. Jones observes, that in several places about the plain, the same kind of stone, of which this antiquity consists, may be found; and stones of far greater dimensions than any at Stone-heng; particularly about Aibury, about fifteen miles from it. And it is well known that the ancients transported much heavier weights to a greater distance, and raised them to a greater height, than are observed in the present case. The most ancient and vulgar opinion concerning the first foundation of Stone-heng is, that it was erected by the renowned British-Roman Aurelius Ambrosius, in memory of four hundred and sixty noble Britons invited to a treaty of accommodation, held in or near the town of Ambresbury, by Hengist the leader of the Saxons, and treacherously murdered by him and his confederates. Giraldus Cambrensis relates, that there was in Ireland a pile of stones called the Giants' Dance, because giants brought them from the remotest parts of Africa into Ireland, and miraculously set them up in the plains of Kildare. And (according to the British story) Aurelius Ambrosius, king of the Britons, procured Merlin, by supernatural means, to bring them from Ireland into Britain, for the purpose above mentioned. The principal, if not the first author, who ascribes Stone-heng to Ambrosius (Hist. Britan. lib. vi.) Mr. S. Gale inclines to this opinion, on account of the name Ambrosius, which is still retained in the neighbouring town of Ambresbury, once celebrated for its monastery of three hundred monks, founded here by Ambrosius, on condition that they should pray for the souls of those that were slain by the treachery of Hengist the Saxon. Another opinion is that which is founded chiefly on the authority of Polydore Virgil (lib. iii.), who says, that the Britons erected this magnificent sepulchre for their general Ambrosius, in the place where he was slain in battle; that his fortitude and achievements for the good of his country might neither be forgotten among themselves, nor left unremembered by posterity. This monument, he says, is yet remaining in the diocese of Salisbury, near the town called Ambresbury. To this opinion some circumstances in his history, the still remaining Latin name of the place (Mons Ambrosii), and that very ancient Welch proverb, *Mal gwaith Ambrys*, "like the work of Ambrose," give some countenance.

A third conjecture is that of Mr. Bolton, translator of Lucius Floris, and author of Nero Cæsar, published in 1624, who says, that Stone-heng was built by the old Britons, as a sepulchral monument for their magnanimous but unfortunate queen Boadicea, who with all her principal nobility was totally overthrown in battle by a small army of Romans, under the command of Suetonius Paulinus. Mr. Inigo Jones having recited these opinions, as well as that of those who ascribe the structure of Stone-heng to the Druids, and urged the improbabilities and objections to which each of them is liable, advances his own opinion; and this is, that Stone-heng was a work of the Romans, built by them when they flourished here in the greatest peace and prosperity, probably betwixt the time of Agricola's government, and the reign of Constantine; not as a sepulchral monument, but as a temple, and particularly consecrated to the imaginary deity Cœlus, whence they derived the original of all things. That the Romans were the founders of Stone-heng he argues from its magnificence, order, which is the Tuscan, architectonical scheme, consisting of four equilateral triangles, inscribed within a circle, double portico in the greater circle of stones, and another portico in the cell or hexagon, the manner and position of the columns of the building, and from the Roman reliques often found near the place. That it was a temple, he infers from the interval or spacious court round about, the cell and its porticos, the altar, and its position eastward, the mixed or compound order, the aspect of the whole fabric, and the skulls of beasts digged up in the circumjacent ground. And that it was consecrated to the god Cœlus he concludes from the situation, the aspect hypæthros, the manner or form, the order, the decorum of the structure, the pyramidal figure of the stones, and from the kinds of beasts customarily offered in sacrifice to that deity.

Dr. Charleton has endeavoured to refute the claims urged by Mr. Jones in favour of the Romans, and to prove that Stone-heng was a Danish structure. For this purpose he alleges, that of all nations in the world none were so much addicted to monuments of huge and unhewn stones as the Danes appear to have been for many hundred years together; that they used to set up such not only in their own country, but also in all other places wherever the fortune of war had at any time made their adventures and achievements memorable; and more particularly in England and Scotland; that in Denmark there are now stupendous piles of stones in most particulars resembling Stone-heng; that upon a strict and impartial enquiry, neither the ancient Britons, nor Romans, nor Saxons, are found to have any justifiable title to the honour of founding this structure; that none of our old historians mention any such work till long after the Danes had acquired the sovereign power in this island, and left several monuments of their victorious armies; that the great impairment of the fabric since the time of the Danish conquest doth not evince it to be of greater antiquity; and that neither the magnificence of the same at first, nor the strength and skill in engines required for the transportation and elevation of stones of such prodigious weight, are sufficient arguments to the contrary. This writer is of opinion that this structure was erected in the beginning of the reign of Alfred, when the Danes, having over-run the whole kingdom, encamped their main army in Wiltshire near two years together, and employed their time of rest and security in erecting Stone-heng, as a place in which to elect and inaugurate their supreme commander king of England, according to the custom of their country; which Dr. Charleton says, was to erect courts royal of huge stones for the election of their kings in all countries where the success of their arms had given them a title to sovereignty. The weakness of the distressed Alfred afforded them an opportunity, and the country in which they were encamped supplied them with fit materials for so great and stupendous a work.

Mr. Inigo Jones's opinion was afterwards vindicated from the objections of Dr. Charleton, and his hypothesis invalidated by Mr. John Webb. See Jones's Antiquity of Stone-heng restored, drawn up by direction of king James I. in 1620, and published in 1655, after the author's death, by Mr. John Webb; Dr. Walter Charleton's Chorea Gigantum, composed from authorities and arguments furnished by Olaus Wormius, the celebrated antiquary of Denmark, and published in 1633; and Mr. John Webb's Vindication of Stone-heng restored, wherein the Roman architecture is discussed, published in 1664. Bishop Nicholson inclines to the opinion, if the true old writing of the name be Stan-Hengist, as the Monasticon seems to tell us, that the Saxons have as just a title as any to the honour of it.

Sammes, in his Britannia Antiqua illustrata, 1676, p. 395, &c. apprehends that Stone-heng is of more ancient date than that of the Romans. The fable of the giants, recorded by Giraldus Cambrensis, and already mentioned, is, in his opinion, founded on an ancient tradition; and by the giants he understands the Phœnicians; and that the art of erecting these stones, instead of the stones themselves, was brought from the farthermost parts of Africa, the known habitations of the Phœnicians. The metal table, formed of a mixture of tin and lead, which was found near Stone-heng in the time of Henry VIII. and upon which many letters are inscribed that have puzzled our antiquaries, he supposes to have been of Phœnician composure, and the characters (which Dr. Charleton apprehends to have been Runic or Gothic, such as were constantly used by the Danes in all their antique monumental inscriptions) Phœnician. He is farther of opinion, that this pile was dedicated to Hercules, to whom the Phœnicians built altars and erected temples, as their tutelar deity, whom they adored as the sun, and who is said by some to have first discovered this nation.

Mr. Aubrey, in his Monumenta Britannica, considers Stone-heng as a British work. Dr. Stukely, in his Stonehenge, a Temple restored to the British Druids, ascribes it to the Druids; and the time he assigns for the building of it is not long after Cambyses's invasion of Egypt, when he committed such horrid outrages there, and made such dreadful havoc with the priests and inhabitants in general, that they dispersed themselves to all parts of the world; some of whom, it is supposed, migrated as far westward as Britain, and introduced their learning, arts, and religion, among the Druids, who are said to have been introduced into Britain about Abraham's time, and probably assisted in this work. This conjecture is the more probable, says this author, because at the period now mentioned the Phœnician commerce was at its height, and afforded a ready conveyance hither: it might be easily made, Dr. Langwith thinks, probable, at least, that it was a temple dedicated to the sun and moon, and having taken his measures of it on the spot, he assures us that he could by no means reconcile them with Mr. Inigo Jones's idea of a Roman temple.

The learned Mr. Bryant, in his Analysis of Ancient Mythology, vol. iii. p. 533, apprehends that there is not in the world a monument which is much prior to Stone-henge. There is reason to think that it was erected by a foreign colony of Cuthites, or sons of Chush (see DISPERSION OF MANKIND), probably before the time when the Druids and Celtæ were first known, and one of the first which came into this island. With them it was usual to place one vast stone upon another for a religious memorial; and these they often placed so equably, that even a breath of wind would sometimes make them vibrate. Of such stones one remains at this day in the pile of Stone-henge. The ancients distinguished stones erected with a religious view by the name of amber; by which was signified any thing solar and divine. The Grecians called them ϖετραι αμϐροσιαι, *petræ ambrosiæ*. Stone-henge, according to Mr. Bryant, is composed of these amber stones; hence the next town is denominated Ambresbury, not from a Roman Ambrosius, for no such person existed; but from the *ambrosiæ petræ*, in whose vicinity it stood. Some of these were rocking stones; and there was a wonderful monument of this sort near Penzance, in Cornwall, which still retains the name of main-amber, or the sacred stones. Such a one is mentioned by Apollonius Rhodius, supposed to have been raised in the time of the Argonautæ, in the island Tenos, as the monument of the two-winged sons of Boreas, slain by Hercules; and there are others in China and other countries.

STO'NEHORSE. *s.* (*stone* and *horse.*) A horse not castrated (*Mortimer*).

STO'NEPIT. *s.* (*stone* and *pit.*) A quarry; a pit where stones are dug (*Woodward*).

STO'NEPITCH. *s.* Hard inspissated pitch (*Bacon*).

STONE WARE, a species of pottery, so called from its hardness. See DELFT WARE, PORCELAIN, and POTTERY. Clay is a principal ingredient in pottery of all kinds, which has the property of hardening in the fire, and of receiving and preserving any form into which it is moulded. One kind of clay resists the most violent action of the fire, after being hardened to a certain degree; but is incapable of receiving a sufficient degree of hardness and solidity. A second kind assumes a hardness resembling that of flint, and such a compactness, that vessels made of it have a glossy appearance in their fracture, resembling porcelain. These two species owe their peculiar properties, of resisting heat without melting, to sand, chalk, gypsum, or ferruginous earth, which they contain. A third species of clay begins to harden with a moderate fire, and melts entirely with a strong fire. It is of the second species that stone ware is made. The most famous manufactory of stone ware, as well as of other kinds of pottery, is at Burslem in Staffordshire. This can be traced, with certainty, at least two centuries back; but of its first introduction no tradition remains. In 1686, as we learn from Dr. Plot's Natural History of Staffordshire, published in that year, only the coarse yellow, red, black, and mottled wares were made in this country; and the only materials employed for them appear to have been the different coloured clays which are found in the neighbourhood, and which form some of the measures or strata of the coal mines. These coarse clays made the body of the ware, and the glaze was produced by powdered lead ore, sprinkled on the pieces before firing, with the addition of a little manganese for some particular colours. The quantity of goods manufactured was at that time so inconsiderable, that the chief sale of them, the doctor says, was "to poor crate-men, who carried them on their backs all over the country." About the year 1690, two ingenious artisans from Germany, of the name of Eller, settled near Burslem, and carried on a small work for a little time. They brought into this country the method of glazing stone ware, by casting salt into the kiln while it is hot, and some other improvements of less importance; but, finding they could not keep their secrets to themselves, they left the place rather in disgust. From this time various kinds of stone ware, glazed by the fumes of salt, in the manner above-mentioned, were added to the wares before made. The white kind, which afterwards became, and for many succeeding years continued, the staple branch of pottery, is said to have owed its origin to the following accident. A potter, Mr. Astbury, travelling to London, perceived something amiss with one of his horse's eyes; an hostler at Dunstable said he could soon cure him, and for that purpose put a common black flint stone into the fire. The potter observing it when taken out, to be of a fine white, immediately conceived the idea of improving his ware by the addition of this material to the whitest clay he could procure: accordingly he sent home a quantity of the flint stones of that country, where they are plentiful among the chalk, and by mixing them with tobacco-pipe clay, produced a white stone ware, much superior to any that had been seen before. Some of the other potters soon discovered the source of this superiority, and did not fail to follow his example. For a long time they pounded the flint stones in private rooms, by manual labour in mortars; but many of the poor workmen suffered severely from the dust of the flint getting into their lungs, and producing dreadful coughs, consumptions, and other pulmonary disorders. These disasters, and the increased demand for the flint powder, induced them to try to grind it by mills of various constructions; and this method being found both effectual and safe, has continued in practice ever since. With these improvements, in the beginning of the last century, various articles were produced for tea and coffee equipages. Soon after, attempts were made to furnish the dinner table also; and, before the middle of the century, utensils for the table were manufactured in quantity, as well for exportation as home consumption. But the salt glaze, the only one then in use for this purpose, is in its own nature so imperfect, and the potters, from an injudicious competition among themselves for cheapness, rather than excellence, had been so inattentive to elegance of form, and neatness of workmanship, that this ware was rejected from the tables of persons of rank; and about the year 1760, a white ware, much more beautiful and better glazed than ours, began to be imported in considerable quantities from France. This inundation of a foreign manufacture, so much superior to any of our own, must have had very bad effects upon the potteries of this kingdom, if a new one, still more to the public taste, had not appeared soon after. In the year 1763, Mr. Josiah Wedgewood, who had already introduced several improvements into this art, invented a species of earthen ware for the table, quite new in its appearance, covered with a rich and brilliant glaze, bearing sudden alternations of heat and cold, manufactured with ease and expedition, and consequently cheap, and having every requisite for the purpose intended. To this new manufacture the queen was pleased to give her name and patronage, commanding it to be called queen's ware, and honouring the inventor by appointing him her majesty's potter. The common clay of the country is used for the ordinary sorts; the finer kinds are made of clay from Devonshire and Dorsetshire, chiefly from Biddeford; but the flints from the Thames are all brought rough by sea, either to Liverpool or Hull, and so by Burton. There is no conjecture formed of the original reason of fixing the manufacture in this spot, except for the convenience of plenty of coals, which abound under all the country. The flints are first ground in mills, and the clay prepared by breaking, washing, and sifting, and then they are mixed in the requisite proportions. The flints are bought first by the people about the country, and by them burnt and ground, and sold to the manufacturers by the peck. The mixture is then laid in large quantities on kilns, to evaporate the moisture; but this is a nice work, as it must not be too dry; next it is beat with large wooden hammers, and then is in order for throwing, and is moulded into the forms in which it is to remain; this is the most difficult work in the whole manufacture. A boy turns a perpendicular wheel, which by means of thongs turns a small horizontal one, just before the thrower, with such velocity that it twirls round the lump of clay he lays on it into any form he directs it with his fingers.

There were many years ago 300 houses, which were calculated to employ, upon an average, 20 hands each, or 6000 in the whole; but of all the variety of people that work in what may be called the preparation for the employment of the immediate manufacturers, the total number is said to be not much short of 15,000, and it is increasing every day. Large quantities are exported to Germany, Ireland, Holland, Russia, Spain, the East Indies, and much to America; some of the finest sorts to France.

STONEHIVE, or STONEHAVEN, a seaport of Scotland, and the county-town of Kincardineshire. The harbour is secured by a high rock and stone pier. Near it are the ruins of the castle of Dunnotyre, on a lofty perpendicular rock almost surrounded by the sea. The town has a manufacture of brown linen, and some trade in dried fish and oil. It is 20 miles N.N.E. of Montrose. Lon. 2. 6 W. Lat. 56. 55 N.

STO'NINESS. *s.* (from *stony*.) 1. The quality of having many stones (*Hearne*). 2. Hardness of mind (*Hammond*).

STONINGTON, a seaport of Connecticut, in New London county. The harbour sets up from Long Island sound, opposite Fisher Island. It is 14 miles E. of New London. Lon. 71. 58 W. Lat. 41. 26 N.

STO'NY. *a.* (from *stone*.) 1. Made of stone (*Dryden*). 2. Abounding with stones (*Milt.*). 3. Petrific (*Spenser*). 4. Hard; inflexible; unrelenting (*Swift*).

STOOD. The preterit of *To stand*.

STOOL. *s.* (ꞅꞇol, Saxon; *stoel*, Dutch.) 1. A seat without a back, so distinguished from a chair (*Prior*). 2. Evacuation by purgative medicines (*Arbuthnot*). 3. STOOL *of Repentance*, or *Cutty stool*, in the kirks of Scotland, is somewhat analogous to the pillory. It is elevated above the congregation. In some places there may be a seat in it; but it is generally without, and the person stands therein who has been guilty of fornication, for three Sundays in the forenoon; and after sermon is called upon by name and surname, the beadle or kirk-officer bringing the offender, if refractory, forward to his post; and then the preacher proceeds to admonition. Here too are set to public view adulterers, in a coarse canvas, analogous to a hairy vest, with a hood to it, which they call the sack or sackcloth, and that every Sunday throughout a year, or longer (*L'Estrange*).

STO'OLBALL. *s.* (*stool* and *ball*.) A play where balls are driven from stool to stool (*Prior*).

To STOOP. *v. n.* (ꞅꞇupıan, Sax. *stuypen*, Dutch.) 1. To bend down; to bend forward (*Raleigh*). 2. To lean forward standing or walking (*Stillingfleet*). 3. To yield; to bend, to submit (*Dryden*). 4. To descend from rank or dignity (*Boyle*). 5. To yield; to be inferiour (*Addison*). 6. To sink from resolution or superiority; to condescend (*Hooker*). 7. To come down on prey as a falcon (*Milton*). 8. To alight from the wing (*Dryden*). 9. To sink to a lower place (*Milton*).

Stoop. *s.* (from the verb.) 1. Act of stooping; inclination downward. 2. Descent from dignity or superiority (*Dryden*). 3. Fall of a bird upon his prey (*Waller*). 4. (ꞅꞇoppa, Saxon; *stoope*, Dutch.) A vessel of liquor (*Denham*).

STO'OPINGLY. *ad.* (from *stooping*.) With inclination downward (*Wotton*).

To STOP. *v. a.* (*stoppare*, Italian; *stoppen*, Dutch.) 1. To hinder from progressive motion (*Shakspeare*). 2. To hinder from successive operation (*Dorset*). 3. To hinder from any change of state, whether to better or worse. 4. To hinder from action or practice (*Shakspeare*). 5. To put an end to the motion or action of any thing; to intercept (*Dryden*). 6. To repress; to suspend (*South*). 7. To suppress (*Dryden*). 8. To regulate musical strings with the fingers (*Bacon*). 9. To close any aperture (*Arbuthnot*). 10. To obstruct; to encumber (*Milton*). 11. To garnish with proper punctuation.

To Stop. *v. n.* 1. To cease to go forward (*Gay*). 2. To cease from any course of action (*Lesley*).

Stop. *s.* (from the verb.) 1. Cessation of progressive motion (*L'Estrange*). 2. Hinderance of progress; obstruction; act of stopping (*Hooker. Graunt*). 3. Repression; hinderance of operation (*Locke*). 4. Cessation of action (*Shakspeare*). 5. Interruption (*Shakspeare*). 6. Prohibition of sale (*Temple*). 7. That which obstructs; obstacle; impediment (*Spenser*). 8. Instrument by which the sounds of wind music are regulated (*Shakspeare*). 9. Regulation of musical chords by the fingers (*Bac.*). 10. The act of applying the stops in music (*Daniel*). 11. A point in writing, by which sentences are distinguished. See Punctuation.

Stop. A word applied by violin and violoncello performers to that pressure of the strings by which they are brought into contact with the finger-board, and by which the pitch of the note is determined. Hence a string, when so pressed, is said to be stopt.

Stop of an organ. A collection of pipes similar in tone and quality, which run through the whole, or a great part, of the compass of the instrument. In a great organ the stops are numerous and multifarious, commonly comprising the following:

Open diapason stop. A metallic stop which commands the whole scale of the organ, and which is called open in contradistinction to the stopt diapason, the pipes of which are closed at the top.

Stopt diapason stop. A stop, the pipes of which are generally made of wood, and its base up to middle C always of wood. They are only half as long as those of the open diapason, and are stopped at the upper end with wooden stoppers or plugs, which render the tone more soft and mellow than that of the open diapason.

Principal stop. A metallic stop originally distinguished by that name, because holding, in point of pitch, the middle station between the diapason and fifteenth, it forms the standard for tuning the other stops.

Twelfth stop. A metallic stop so denominated from its being tuned twelve notes above the diapason. This stop, on account of its pitch, or tuning, can never properly be used alone. The open diapason, stopt diapason, principal, and fifteenth, are the best qualified to accommodate it to the ear.

Fifteenth stop. A stop which derives its name from its pitch, or scale, being fifteen notes higher than that of the diapason. This stop and the twelfth, mellowed and embodied by the two diapasons and principal, form a proper compound for accompanying choral parts in common choirs and parochial churches.

Sesquialtera stop. A mixed stop running through the scale of the instrument, and consisting of three, four, and sometimes five ranks of pipes, tuned in thirds, fifths, and eighths. In small organs this stop is generally divided at middle C, when the lower part is called the sesquialtera, and the upper part the cornet. The whole of the stop lies above the fifteenth; the first rank being a seventeenth, the second rank a nineteenth, and the third rank a twenty-second, above the diapason.

Mixture or furniture stop. A stop comprising two or more ranks of pipes, shriller than those of the sesquialtera, and only calculated to be used together with that and other stops. The mixture is nearly the same as the sesquialtera, and greatly enriches the instrument.

Trumpet stop. A reed metallic stop, so called because its tone is imitative of the trumpet. In large organs it generally extends through the whole compass. The mouths of its pipes are not formed like those of the pipes of other stops, but resemble that of the real trumpet. At the bottom of each of the pipes of this stop, in a cavity called the socket, is fixed a brass reed, stopt at the lower end, and open in front; it is furnished with a tongue, or brass ring, which covers the opening, and which, when the wind is impelled into the pipe, is thereby put into a vibratory motion, which produces the imitative tone peculiar to this stop. The trumpet stop is the most powerful in the instrument, and improves the tone as much as it increases the peal of the chorus. Unisonous with the diapasons it strengthens the foundation, subdues the dissonances of the thirds and fifths of the sesquialtera, and imparts to the compound a richness and grandeur of effect adequate to the sublimest subjects.

Clarion or octave trumpet stop. A reed stop resembling the tone of the trumpet, as may be inferred from its name; but the scale of which is an octave higher than the trumpet stop. This stop forms a brilliant supplement to the chorus, and is judiciously employed on occasions which require every power of the instrument; but should not be commonly opened, or indeed ever without the other stops.

Tierce stop. A stop which is tuned a major third higher than the fifteenth, and only employed in the full organ.

Larigot stop, or octave twelfth. A stop, the scale of which is an octave above the twelfth. Only used in the full organ.

Cornet stop. A stop consisting of five pipes to each note, tuned somewhat in the manner of the sesquialtera, having, beside the unison of the diapason, its third, fifth, eighth, and seventeenth. The cornet being only a treble stop, it is employed in parish-churches in conjunction with the diapason in interludes, and the giving out of the psalms.

Dulciana stop. A stop in the choir organ of a peculiar sweetness of tone, which it chiefly derives from the bodies of its pipes being longer and smaller than those of the pipes of other stops. It is in unison with the diapasons, and equals them in compass upward, but only descends to G gamut.

Flute stop. A stop imitative of the common flute, or flageolet. It is in unison with the principal, but of a much softer tone than that stop.

Bassoon stop. A reed stop imitative of the instrument from which it derives its name. This stop, so far as it extends upward in the scale, is in unison with the diapasons, in company with which it only ought to be used.

Vox-humana stop. A reed stop, the tone of which, as its name implies, resembles the human voice. The quality of this stop is seldom so good as to render it agreeable when heard alone; it is therefore advantageously blended with the diapasons, with which it is in unison.

Hautboy stop. A reed stop voiced in imitation of the hautboy. It is in unison with the diapasons, with which it only should be used.

Cremona stop. A reed stop in unison with the diapasons. The name of this stop has induced most organ-builders erroneously to suppose that it was originally meant as an imitation of the Cremona violin; but the writers best informed upon the subject inform us, that it was designed to imitate an ancient instrument called a krum-horn, which word has been corrupted into cremona.

STO′PCOCK. *s.* (*stop* and *cock.*) A pipe made to let out liquor, stopped by a turning cock (*Grew*).

STO′PGAP. *s.* (*stop* and *gap.*) Something substituted; a temporary expedient.

STO′PPAGE. *s.* (from *stop.*) The act of stopping; the state of being stopped (*Arbuthnot*).

STO′PPLE, or STOPPER. *s.* (from *stop.*) That by which any hole, or the mouth of any vessel, is filled up (*Ray*).

STORAX. (ϛοραξ). See STYRAX.

STORAX LIQUID. See LIQUIDAMBRA.

STORAX LIQUIDA. See LIQUIDAMBRA.

STORAX WHITE. See BALSAMUM PERUVIANUM.

STORE. *s.* (*stor*, Runic, much.) 1. Large number; large quantity; plenty (*Dryden*). 2. A stock accumulated; a supply hoarded (*Ad.*). 3. The state of being accumulated; hoard (*Deuteronomy*). 4. Storehouse; magazine (*Milton*).

STORE. *a.* Hoarded; laid up; accumulated (*Bacon*).

To STORE. *v. a.* (from the noun.) 1. To furnish; to replenish (*Denham*). 2. To stock against a future time (*Locke*). 3. To lay up; to hoard (*Bacon*).

STO′REHOUSE. *s.* (*store* and *house.*) 1. Magazine; treasury (*South*). 2. A great mass reposited (*Spenser*).

STO′RER. *s.* (from *store.*) One who lays up.

STO′RIED. *a.* (from *story.*) Furnished with stories; adorned with historical pictures (*Pope*).

STORK. *s.* (ꞅꞇoꞃc, Saxon.) A bird of passage, famous for the regularity of its departure. See ARDEA.

STORKAU, a town of Upper Saxony, in the Ucker marche of Brandenburg, 24 miles E.S.E. of Berlin, and 26 W.S.W. of Frankfort on the Oder. Lon. 13. 35 E. Lat. 52. 24 N.

STORM. *s.* (*ystorm*, Welsh; ꞅꞇoꞃm, Sax. *storm*, Dutch.) 1. A tempest; a commotion of the elements (*Milton*). 2. Assault on a fortified place (*Dryden*). 3. Commotion; sedition; tumult; clamour; bustle (*Shakspeare*). 4. Affliction; calamity; distress (*Pope*). 5. Violence; vehemence; tumultuous force (*Hooker*).

To STORM. *v. a.* (from the noun.) To attack by open force (*Pope*).

To STORM. *v. n.* 1. To raise tempests (*Sp.*). 2. To rage; to fume; to be loudly angry (*Swift*).

STORMARIA, a principality in the duchy of Holstein, bounded on the N. by Holstein Proper, on the E. by Wageria and Lawenburg, and on the S. and W. by Lunenburg and Bremen, from which it is separated by the Elbe. Gluckstadt is the capital.

STO′RMY. *a.* (from *storm.*) 1. Tempestuous. 2. Violent; passionate.

STORNAWAY, a seaport of Scotland, on the E. side of the isle of Lewis, at the head of Loch Stornaway, which is a good harbour for ships of any burden. It is a port of the customhouse, and has a postoffice, and a regular packet weekly. Lon. 6. 38 W. Lat. 58. 18 N.

STORTFORD, or BISHOP STORTFORD, a town in Hertfordshire, with a market on Thursday. On the E. side are the ruins of a castle, on an artificial mount. It is seated on the side of a hill, on the river Stort, which is navigable hence to the Lea, 16 miles E.N.E. of Hertford, and 30 N.N.E. of London.

STO'RY. *s.* (ꞅꞇœꞃ, Sax. *storie*, Dutch.) 1. History; account of things past (*South*). 2. Small tale; petty narrative; account of a single incident (*Addison*). 3. An idle or trifling tale; a petty fiction (*Swift*). 4. (ꞅꞇoꞃ, place, Saxon.) A floor; a flight of rooms (*Wotton*).

To Sto'ry. *v. a.* (from the noun.) 1. To tell in history; to relate (*Wilkins*). 2. To range one under another (*Bentley*).

STO'RYTELLER. *s.* (*story* and *tell.*) One who relates tales in conversation; a historian, in contempt (*Swift*).

STOVE. *s.* (from *stoo*, Islandic, a fire-place.) In domestic economy, a contrivance or apparatus, in which fires are made, with the view of conveying heat throughout houses, &c. See Fire-place.

Heat, as well as light, is communicated to distant bodies in an instant, by radiation. A person passing hastily by the door of a glass-house feels the glow of heat in the very moment he sees the dazzling light of the furnace mouth, and it is interrupted by merely screening his face with his hand. In this way is an apartment partly warmed by an open fire; and we avoid the oppressive heat by sitting where the fire is not seen, or by interposing a screen. We are apt to connect this so strongly in the imagination with the light emitted by the fire, that we attribute the heat to the immediate action of the light. But this opinion is shown to be gratuitous by a curious experiment made before the Royal Society by Dr. Hooke, and afterwards, with more care and accurate examination, by Mr. Scheele. They found, that by bringing a plate of the most transparent glass briskly between the fire and one's face, the heat is immediately intercepted without any sensible diminution of the light. Scheele, by a very pretty investigation, discovered that the glass made the separation, and did it both in refraction and reflection; for he found, that when the light of the same fire was collected into a focus by means of a polished metal concave speculum, a thermometer placed there was instantly affected. But if we employ a glass speculum foiled in the usual manner with quicksilver, of the same diameter and focal distance, and of equally brilliant reflection, there is hardly any sensible heat produced in the focus, and the thermometer must remain there for a very long while before it is sensibly affected. When we repeated this curious experiment, we found, that after the glass has remained a long while in this position, whether transmitting or reflecting the light, it loses in a great measure its power of intercepting the heat. By varying this observation in many of its circumstances, we think ourselves entitled to conclude, that the glass absorbs the heat which it intercepts, and is very quickly heated by the absorption. While it rises in its own temperature, it intercepts the heat powerfully; but when it is, as it were, saturated, attracting no more than what it immediately imparts to the air in corporeal contact with it, the heat passes freely through along with the light. If the glass be held so near the fire that the surrounding air is very much heated, no sensible interruption of heat is perceived after the glass is thus saturated. We found the check more quickly sensible than the thermometer of this instantaneous radiation of the heat which accompanies the light, or is separated from it in this experiment. It is a very instructive experiment in the physiology of heat.

We cannot say how far this radiation of heat may extend, nor whether the accompanyment of light is absolutely necessary. The mathematician proceeds on the supposition that it extends as far as the radiation of light, and that, being also rectilineal, the density of the heat is proportional to that of the light. But these notions are somewhat gratuitous; and there are appearances which render them doubtful. When with a lens of an inch in diameter we form a focus on a piece of black unpolished marble of an inch diameter, the mathematician must allow that no more rays fall on the marble than if the lens were away: therefore the marble should be equally warmed in either case. But it is by no means so, as we have repeatedly found by exposing it during equal times, and then dropping it into water. The water which is heated by the marble on which the focus has been formed will be found to have acquired from it much more heat than from the other. The tops of lofty mountains which are never shaded by clouds, but enjoy perpetual sunshine and serenity, instead of being warmer than the valleys below, are covered with never-melting snow; and we have some grounds to suspect that the genial influence of the sun requires the co-operation of the atmosphere, and to doubt whether there is any warmth at the moon, on which no atmosphere like ours can be observed. Perhaps the heat which cheers us, and fertilizes our earth, is chemically separated from our atmosphere by its elective attraction for the light of the sun. Our successors in the study of meteorology need not fear that the subject of their research will be soon deprived of scientific allurements. We know but little of it after all the progress we have made during this last century, and it still presents an ample field of discussion.

We said that the accompanyment of light is not demonstrably necessary. We are certain that heat may be imparted without any sensible light, in a manner which we can hardly suppose any thing but radiation. If a piece of very hot iron be placed a little without the principal focus of a metallic concave speculum, and a very sensible air-thermometer be placed in its conjugate focus, it will instantly show an elevation of temperature, although the iron is quite imperceptible to an eye which has even been a long while in the dark. No such rise of temperature is observed if the thermometer be placed a little to one side of the focus of the speculum; therefore the phænomenon is precisely similar to the radiation of light. We are obliged therefore to acknowledge that the heat is radiated in this experiment in the same way that light is in the common optical experiments.

Although this is the most usual way that we in this country employ fuel for warming our apartments, it is by no means the only way in which the heat diffused from this fuel may be imparted to distant bodies. It is not even the most effectual method; it is diffused also by immediate communication to bodies in contact. The air in immediate contact with the burning fuel is heated, and imparts some of its heat to the air lying beyond it, and this is partly shared with the air which is still farther off; and this diffusion, by communication *in contactu*, goes on till the remote air contiguous to the walls, the floor, the ceiling, the furniture, the company, all get a share of it in proportion to their attractions and their capacities. And as the air is thus continually supplied, and continually gives out heat, the walls, &c. become gradually warmer, and the room becomes comfortable and pleasant. But we apprehend that no great proportion of the heat actually acquired by the room is communicated in this way. This diffusion by contact is but slow, especially in air which is very dry; so slow indeed, that the air in the immediate neighbourhood of the fuel is hurried up the chimney before it has time to impart any of the heat received in contact. We know that the time employed in diffusing itself in this way through stagnant air to any moderate distance is very considerable. We imagine, therefore, that the heat communicated to our rooms by an open fire is chiefly by radiation, but in a way something different from what we mentioned before. We imagine, that as the piece of glass in Dr. Hooke's experiment absorbs the heat, so the whole mass of air which fills the room intercepts the radiated heat in every part of the room where the fire is seen, and is as it were saturated with it throughout, and ready to impart it to every body immersed in it. We cannot otherwise account for the equability of the heat in the different parts of the room. Mere radiation on the solid bodies would warm them in the inverse duplicate ratio of their distances from the fire; and diffusion by contact, if compatible with the rapid current up the chimney, would heat the room still more unequably. Recollect how slowly, and with what rapid diminution of intensity, the colour of blue vitriol is communicated to water even to a very small distance. But because all parts of the air of the room absorb radiated heat, what is saturated at a higher temperature, being nearer to the fire, rises to the ceiling, spreads outwards along the ceiling, and has its place supplied by the air, which is thus pushed towards the fire from the places which are not directly illuminated.

Far different is the method of warming the room by a stove. Here the radiation, if any, is very feeble or scanty; and if a passage were allowed up the chimney for the warmed air, it would be quickly carried off. This is well known to the English who reside in the cold climates of St. Petersburgh, Archangel, &c. They love the exhilarating flutter of an open fire, and often have one in their parlour; but this, so far from warming the room during the extreme cold weather, obliges them to heat their stoves more frequently, and even abstracts the heat from a whole suite of apartments. But all passages this way is shut up when we warm a room by stoves. The air immediately contiguous to the stove is heated by contact, and this heat is gradually, though slowly, diffused through the whole room. The diffusion would however be very slow indeed, were it not for the great expansibility of air by heat. But the air surrounding the stove quickly expands and rises to the ceiling, while the neighbouring air slides in to supply the place, nay is even pushed in by the air which goes outwards aloft. Thus the whole air is soon mixed, and the room acquires almost an equal temperature throughout.

The warming by stoves must therefore be managed upon very different principles from those adopted in the employment of open fires. The general principle is, 1st, To employ the fuel in the most effectual manner for heating the external part of the stove, which is immediately efficient in warming the contiguous air; and, 2d, To keep in the room the air already warmed, at least as much as is consistent with wholesomeness and cleanliness.

The first purpose is accomplished by conducting the flue of the furnace round its external parts, or, in short, by making every part of the flue external. Of all forms, that of a long pipe, returned backwards and forwards, up and down (provided only that the place of its last discharge be considerably higher than its entry from the fire-place), would be the most effectual. We have seen a very small stove constructed in this way, the whole being inclosed in a handsome case of polished iron plate, pierced and cut into elegant foliage like the cock of a watch, so that the odd looking pipes were completely concealed. Though only three feet long, one foot thick, and six feet high, it warmed a very lofty room of twenty-four feet by eighteen, and consumed less than half the fuel of a stove of the more usual make, which did not so fully warm a smaller chamber.

It would occupy a volume to describe the immense variety of stoves which ingenuity or architectonic taste has constructed. We shall content ourselves with describing, after Guyton de Morveau, the stoves used in Sweden, with apertures emitting heat.

"It is well known," says he, "by the accounts of travellers, that the cold felt in Sweden, during a common winter, exceeds by several degrees that of our most severe winters in France; and yet in no country do the inhabitants defend themselves from the inclemency of the season at a smaller expence. But though these facts are well known, we cannot accumulate too many documents and proofs, when we would convert a vague tradition into a certain conviction, and induce mankind to abandon any ancient long-established custom.

"As to the construction of these stoves, the authors I have examined observe, that it costs very little, saves much of the iron formerly employed, and only requires bricks or square tiles.

"They recommend laying them on their broadest side (*de champ*), to choose them as thin as possible for the interior walls, and to place the circulating flues so that the rain that falls down the flues of the chimney may never find its way into them.

"They also give some directions relative to the feeding these stoves, which is so easy, that in the largest public establishments, a single individual lights all the fires. This supply consists in putting in as much wood as the fire-place, which is very small, will hold, in only introducing sawed wood of equal length, and as soon as it is burnt, shutting the slide that cuts off the communicating of the circulating flues with the chimney-flue; by which means, all the heat the fuel has produced is retained in these channels, escaping slowly, and so as only to spread itself through the apartment; whereas any piece of wood that could not have burnt out in an equal space of time would require the slide to continue open, and the current of air necessary for its combustion would carry off, through the flue of the chimney, the greater part of the heat at first produced."

References to plate 165. Fig. 3, represents a front view of the stove, its height being 164 centimetres, or about 61 inches French, exclusive of the vase, which is merely an unconnected ornament standing on the flat surface at top. Its breadth is 85 centims, or about 31 ½ inches French; its depth is 58 centimetres, or about 21½ inches French; the height may vary according to that of the room, and may without inconvenience be extended to two metres. It may also be reduced for a laboratory stove, which ought to have a sand-bath breast high.

The two other dimensions are determined by those of the bricks employed in constructing the internal circulating flues, which bricks ought to be in certain fixed proportions, that the smoke may pass freely, and yet that it may not be accompanied by a quantity of air sufficient to condense it, or to lower the temperature below the degree of heat requisite for its complete combustion.

VV. The external furniture of the two heating apertures; *m m*, apertures where the air enters, which afterwards issues from the heating apertures. These are closed whenever the air is brought in from without by a connected tube under the floor; which is far more favourable to the renewal of the respirable air of the apartment, and prevents the danger arising from currents of cold air attracted by the fire-place; which becomes necessary, whenever the volume of air in the apartment is insufficient to supply at once the consumption of the fire and the circulation in the heating tubes.

Fig. 4, is the plan of the foundation of the hearth at the line AB, in fig. 3; *ll*, are the vacancies to receive and conduct the air into the compartments where it is to be heated, previous to its issuing from the heating apertures, whether it be brought from without or through the apertures *m m*, in fig. 1.

Fig. 5, is a plan at the line CD, in fig. 3, that is below the door of the fire-place; *n n*, *n n*, the double cast-iron plates forming the compartments, where the air receives heat from the fire; *o o*, vacancies between these iron plates.

Fig. 6, is a front section at the line IK in fig. 5, the darts showing the direction of the smoke in the circulating flues in front. The iron plates *n n*, are here again represented in their perpendicular position, with the tongues that form the compartments on each side of the fire-place. One of these plates is represented in front, fig. 9; T, is an aperture reserved at the bottom of the fourth circulating flue, to establish, if needful, the draught of air in the fire-place, by burning a few slips of paper, or other light combustible substance. This precaution, however, may be neglected, as soon as the stove has been sufficiently heated to expel all its internal moisture.

The door of this air-pump, as it were, must shut accurately. For this purpose it is enough to cut a piece of brick, which may be pierced so as to receive a handle, and affix upon it a piece of wrought iron as a covering.

Fig. 7, is a plan taken at the line EF, in fig. 3.

Fig. 8, is a lateral section at the line GH, in fig. 5, shewing the height of the fire-place, and the first direction of the flame. V, shews the disposal of the heating-flues: the dotted lines shew in profile, the partitions forming the four great circulating flues; R, the tube that conveys the smoke from the circulating flues into the chimney, being furnished with a key to intercept the communication. This is a common flue-pipe of plate-iron; but it would be more advantageous to use, in that part where the slide or stopple acts, some substance that is a worse conductor of heat, as for instance, a pipe made on purpose, of earthen-ware.

The angle formed by this tube in its way to the chimney renders it unnecessary to repeat, that the first condition is that the body of the stove be detached from the wall. That now describing is 25 centimetres from the nearest point of the niche where it stands; S, is an elongation of the perpendicular tube which enters the chimney; it is intended as a receptacle for the water that may be condensed in the upper part, and to prevent its penetrating into the interior of the stove. The cover that terminates this elongation facilitates the cleansing the pipe without taking it to pieces. The dotted lines forming the square space Q, shew the place where a niche or oven, which actually exists in some of the Swedish stoves, may be fixed, and which advantageously varies the masonry-work that would otherwise fill that space. All these figures being drawn on the

MISCELLANIES.

PL. 165.

Fig. 1.

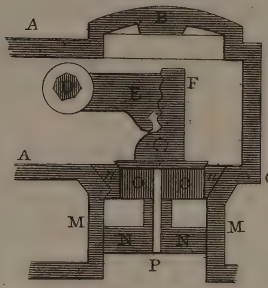
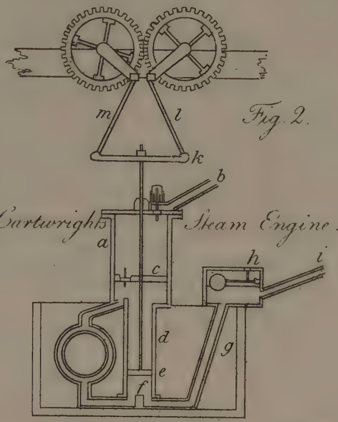


Fig. 2.



Cartwright's Steam Engine.

Fig. 4.

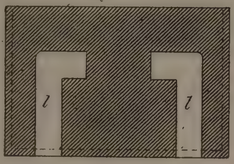


Fig. 5.

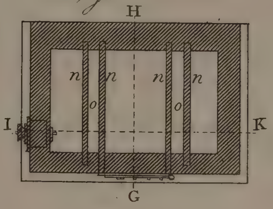


Fig. 7.

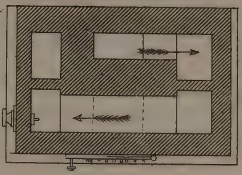


Fig. 3.

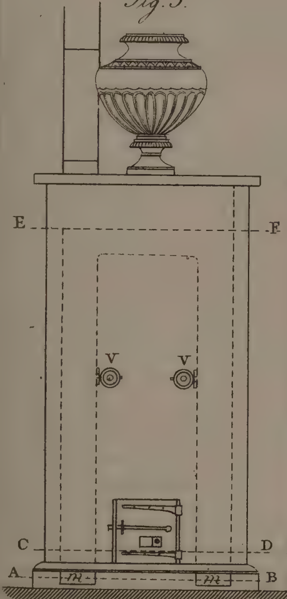


Fig. 9

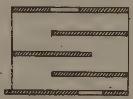


Fig. 6.

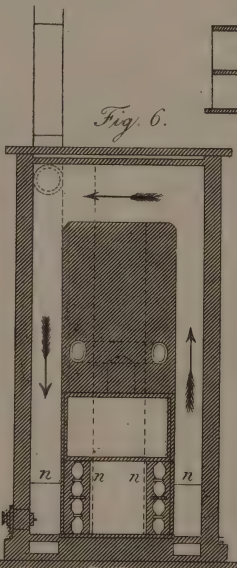
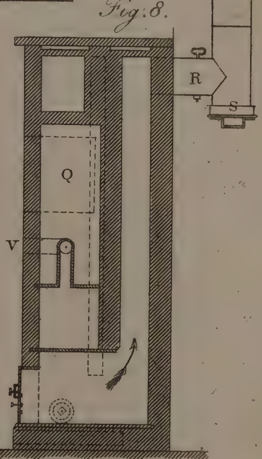
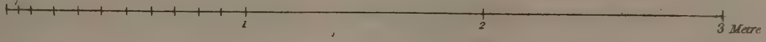


Fig. 8.





Mutlow, sc. Russell Co.

London Published by Sherwood & Co. Paternoster Row, Feb.y 1, 1813.

same scale, the proportions may be easily preserved throughout.

The construction of this stove is neither difficult nor expensive. The external surface may be coated with china tiles similar to those used in common stoves, that is to say, thin in the middle, and with a rim all round; which renders them more firm. They may also be fixed by a plate of metal in form of a girt. The back may be plain brick. The vase which stands on a slab of marble, or stone, is only an ornament.

In case heating apertures should not be wanted, the whole internal part may be built of bricks, of a convenient shape, cemented with diluted potters'-earth, and laid on their broad surface (*de champ*) for the circulating flues, without any other iron-work than a cast-iron plate over the fire-place, the door, and its frame.

The additional expence attending the heating-aperture consists merely of the four cast-iron plates, with their tongues and grooves to form the compartments represented in fig. 7. All the rest is made of iron rolled and nailed; which being once bedded in brick-work, can never suffer the air to escape.

These iron plates with grooves have been well known since the adoption of Dr. Franklin's stove, and there is an engraving of them in his works; but if there be any difficulty in procuring them, the deficiency may be supplied in two ways:

1st. By ends of cast-iron pipes placed vertically beside each other, thus serving as sides to the fire-place, and communicating with each other by small channels above and below, constructed in the brick-work.

2d. By common smooth cast-iron plates, soft enough to be pierced with a drill, in order to affix, with rivetted nails, wrought iron-plates bent into squares throughout their length, which are a complete substitute for the tongues and channels in cast-iron, and as they are never exposed to the flame, there is no danger of their failing.

It may easily be perceived that this last method is the most advantageous, because it occupies less space, and yet offers a larger surface to receive the heat and communicate it to the air; but there are many objections to stoves of this kind.

STOVES, in horticulture, are buildings erected for the purpose of preserving tender plants, which would otherwise perish, from the moisture and coldness of our climate.

These erections are usually divided into two classes, namely, bark and dry-stoves, according to the plan on which they are established. In the former case, a pit is dug to the depth of three or four feet, that generally extends over the whole length of the hot-house, and is filled with fresh tanners' bark, in which the pots, containing the plants, are plunged. See HOT-BED.

Dry-stoves are built of bricks, in the form of flues, which are conveyed either beneath the pavement, or attached to the back wall of the house: one being constructed above another, and returned six or eight times throughout the whole length of the building. In such stoves, it is necessary to arrange the pots on shelves, rising progressively. Their dimensions ought to be adapted to the number of plants to be preserved; the floor being elevated to a greater or smaller height above the surface of the ground, according to the natural humidity or dryness of the soil. It will be necessary to make paths about two feet wide in the front, for the convenience of walking. The furnace may be placed either in the middle, or at one end of the building; but it should, in every case, be adapted to the nature of the fuel to be employed. The best for this purpose is turf; because it burns more uniformly and slowly than any other combustible substance, and consequently requires less attendance.

Such is the manner in which these kinds of stoves are generally constructed; but Dr. Anderson has lately contrived another apparatus, upon a new plan, and accommodated to his patent hothouses: as, however, a mere description of his peculiar stove would convey an imperfect idea of the invention, we are obliged to refer the curious reader, as well as the lover of horticulture, to the first volume of the new series of Dr. A.'s Recreations in Agriculture, &c. where the principle is fully developed, and illustrated with several cuts.

To STOVE. *v. a.* (from the noun.) To keep warm in a house artificially heated (*Bacon*).

To STOUND. *v. n.* (*stunde*, I grieved, Islan.) 1. To be in pain or sorrow: not in use. 2. For *stunned* (*Spenser*).

STOUND. *s.* (from the verb.) 1. Sorrow; grief; mishap (*Spenser*). 2. Astonishment; amazement (*Gay*). 3. Hour; time; season.

STOUR. *s.* (*stur*, Runic, a battle.) Assault; incursion; tumult: obsolete (*Spenser*).

STOUR, a river which rises on the most northerly point of Dorsetshire, passes by Stourminster, Blandford, and Winborn, then enters Hampshire, and flows into the Avon, opposite Christchurch.

STOUR, a river in Kent, which rises in the Weald, flows by Wye and Canterbury, and seven miles below divides into two streams; the smaller one passes to the sea at Reculver, and the main branch flows by Sandwich into Hope bay.

STOUR, a river which forms the entire boundary between Essex and Suffolk, passing by Clare, Sudbury, Neyland, and Manningtree, and being joined by the Orwell from Ipswich, forms the harbour of Harwich.

STOUR, a river which rises in the S. part of Staffordshire, enters Worcestershire at Stourbridge, and flows by Kidderminster into the Severn, opposite Stourport.

STOURBRIDGE, a corporate town in Worcestershire, with a market on Friday, and manufactures of glass, iron, and earthen ware. Here is a freeschool founded by Edward VI.; and in the neighbourhood is a noble hospital for the maintenance and education of 60 boys. It is seated on the Stour, 22 miles N. of Worcester, and 126 N.W. of London.

STOURMINSTER, a town in Dorsetshire, with a market on Thursday, and a manufacture of white baize. Near it are the ruins of a castle, which was the seat of the W. Saxon kings. It is seated on both sides the Stour, over which is a bridge, 20 miles N.E. of Dorchester, and 108 W. by S. of London.

STOURPORT, a village in Worcestershire, four miles S. of Kidderminster. It is a busy centre of inland navigation, seated opposite the place where the river Stour and the Staffordshire and Worcestershire canal enters the Severn, over which river it has a long stone bridge.

STOUT. *a.* (*stout,* Dutch.) 1. Strong; lusty; valiant (*Dryden*). 2. Brave; bold; intrepid (*Psalms*). 3. Obstinate; pertinacious; resolute; proud (*Daniel*). 4. Strong; firm (*Dryden*).

Stout. *s.* A cant name for strong beer (*Swift*).

STOU'TLY. *ad.* (from *stout.*) Lustily; boldly; obstinately.

STOU'TNESS. *s.* (from *stout.*) 1. Strength; valour. 2. Boldness; fortitude (*Ascham*). 3. Obstinacy; stubbornness (*Shakspeare*).

To STOW. *v. a.* (ꞅꞇoƿ, Saxon; *stowen,* Dutch.) To lay up; to reposite in order; to lay in the proper place (*Pope*).

Stow (John), an antiquary, born in Cornhill, London, about 1525. It is supposed that he was bred up to his father's business, that of a taylor. In 1560 he began to make a collection for his chronicle, and whatever was illustrative of the history and antiquities of the country was the object of his researches. These studies were not productive of fame or gain, and he would have abandoned them, had not Parker, the primate, honourably contributed to his encouragement. His first work was a Summary of the Chronicles of England, from the coming in of Brute to his own time, 1573. Afterwards, in 1598, appeared his Survey of London, containing the original, antiquity, &c. of that city, 4to. and in 1600 he published his Flores Historiarum, or annals of this kingdom, from the times of the Britons to his own, dedicated to Whitgift, the primate. This last work was an enlargement of his Summary, but even in that state was little less than an abridgment of a larger work, which he had prepared. In the latter part of his life, Stow was reduced to indigent circumstances: he petitioned twice the corporation of London, whose history he had elucidated; but the relief he received is unknown. He also obtained a brief from the king, to collect the benevolent contributions of well disposed people; and after thus devoting himself for upwards of 40 years, to illustrate the antiquities of his country, and suffering the infirmities of old age, added to the horrors of indigence, he fell a victim to the stone-cholic, 1605, aged about 80. To the merits of an able historian, and indefatigable antiquarian, Stow united all the virtues of private life. He wrote for the public, he adhered to truth, and recorded nothing either through fear, or envy, or favour. He had transcribed many valuable MSS. the originals of which he could not obtain, and he travelled afoot to various cathedrals in search of authentic papers.

STO'WAGE. *s.* (from *stow.*) 1. Room for laying up (*Addison*). 2. The state of being laid up (*Shakspeare*). 3. Money paid for stowing of goods.

STOW MARKET, a town in Suffolk, with a market on Thursday, and a manufacture of woollen stuffs. It has a navigable cut to Ipswich, and is seated on the Orwell, 12 miles N.W. of Ipswich, and 69 N.N.E. of London.

Stow on the Wold, a town in Gloucestershire, with a market on Thursday, seated on a bleak hill, 22 miles E. of Gloucester, and 83 W. by N. of London.

STOWE, Stoe, are the same with the Saxon ꞅꞇoƿ, a place (*Gibson*).

STOWEY, a town in Somersetshire, with a market on Tuesday. It had once a castle, of which no vestiges remain, except the ditch. It is eight miles W. by N. of Bridgewater, and 147 W. by S. of London.

STRABISMUS. (ϛραβιϛμος, from ϛραβιζα, to squint.) Squinting. An affection of the eye, by which the person sees objects in an oblique manner, from the axis of vision being distorted. Cullen arranges this disease in the class locales and order dyscinesiæ.

STRABO, a celebrated Greek geographer, philosopher, and historian, was born at Amasia, and was descended from a family settled at Gnossus in Crete. He was the disciple of Xenarchus, a Peripatetic philosopher, and at length attached himself to the Stoics. He contracted a strict friendship with Cornelius Gallus, governor of Egypt, and travelled into several countries to observe the situation of places and the customs of nations. He flourished under Augustus, and died under Tiberius, about the year 25, in a very advanced age. He composed several works, all of which are lost except his Geography in seventeen books; which are justly esteemed very precious remains of antiquity. The two first books are employed in showing that the study of geography is not only worthy of, but even necessary to a philosopher; the third describes Spain; the fourth, Gaul and the Britannic isles; the fifth and sixth, Italy and the adjacent isles; the seventh, which is imperfect at the end, Germany, the countries of the Getæ and Illyrii, Taurica Chersonesus, and Epirus; the eighth, ninth, and tenth, Greece with the neighbouring isles; the four following, Asia within Mount Taurus; the fifteenth and sixteenth, Asia without Taurus, India, Persia, Syria, Arabia; and the seventeenth, Egypt, Æthiopia, Carthage, and other places of Africa. Strabo's work was published with a Latin version by Xylander, and notes by Isaac Casaubon (or rather by Henry Scrimzeer, from whom Casaubon chiefly stole them), at Paris, 1620, in folio. A most valuable edition is that of Amsterdam, in 1707, in two vols. folio, by the learned Theodore Jansonius ab Almeloveen, with the entire notes of Xylander, Casaubon, Meursius, Cluver, Holstenius, Salmasius, Bochart, Ez. Spanheim, Cellarius, and others. To this edition is subjoined the Chrestomathiæ, or epitome of Strabo; which, according to Mr. Dodwell, who has written a very elaborate and learned dissertation about it, and was made by some unknown person between the years of Christ 676 and 996. It has been found of some use, not only in helping to correct the original, but in supplying in some measure the defect in the seventh book. Mr. Dodwell's dissertation is prefixed to this edition. Falconer's edition, printed at the Clarendon press, and published in folio, at Oxford, 1807, is much and most deservedly esteemed. The account of this work given in No. 28 of the Edinburgh Review is now well known to be a most scandalous piece of misrepresentation. A translation of Strabo into the French language has been recently printed at the imperial press; for a most erudite critique upon the first volume of which, we beg to refer to No. 10 of the Quarterly Review.

STRADA (Famianus), a famous Jesuit, who was a native of Rome, and taught rhetoric there, with high reputation, for 15 years. He wrote several treatises upon the art of oratory, and published some orations; but his Prolusiones Academicæ, and his Historia de Bello Belgico, are his greatest works. He died in 1649, aged 77.

Strada (John), or Stradanus, a Flemish painter, born at Bruges in 1536. After learning the principles of his art in his own country, he went to Italy, where he studied the works of the best masters. He fixed his residence at Florence, and died there in 1604. He painted historical subjects taken from the Scriptures, also hunting scenes.

To STRA'DDLE. *v. n.* To stand or walk with the feet removed far from each other to the right and left; to part the legs wide (*Pope*).

To STRA'GGLE. *v. a.* 1. To wander without any certain direction; to rove; to ramble (*Suckling*). 2. To wander dispersedly (*Clarendon*). 3. To exuberate; to shoot too far (*Mortimer*). 4. To be dispersed; to be apart from any main body; to stand single (*Dryden*).

STRA'GGLER. *s.* (from *straggle.*) 1. A wanderer; a rover; one who forsakes his company (*Swift*). 2. Any thing that pushes beyond the rest, or stands single (*Dryden*).

STRAHLSTEIN, in mineralogy, a talcose earth, denominated Actinolite by Kirwan, and Actinote or Actinotus by Haüy. See these articles. There is also another variety or sub-species of this stone than is mentioned in these articles, which has of late years been discovered at Ahrendahl, in Norway, in veins mixed with quartz, garnets, and magnetic iron ore, and hence denominated arendahlite by several writers, by others acanticonite, and by Haüy, epidot. Its colour is olive-green, passing into grass-green, mountain-green, and brownish-green. It is found in mass, or crystallized in hexahedral prisms, often laterally aggregated: the surface of the crystals smooth and brightly shining. Internally it is more or less shining with a vitreous lustre. Its fracture is between radiated and fibrous. It occurs in slender prismatic or granular distinct concretions. Its fragments are splintery and wedge-shaped. It is translucent, passing to semi-transparent; is moderately hard, very brittle, and easily frangible. Specific gravity 2.9—3.49. The arendahlite has been analyzed by Vauquelin, and the epidot of the Alps by Collet de Cotils, with the following results:

Vauq.		Coll.	
37	- -	37	silex
21	- -	27	alumine
15	- -	14	lime
24	- -	17	oxyd of iron
1.5	- -	1.5	oxyd of manganese
98.5		96.5	

There is a great analogy between the several sub-species of strahlstein and hornblend, tremolite and asbestos.

STRAIGHT. *a.* (*strack*, old Dutch.) 1. Not crooked; right (*Dryden*). 2. Narrow; close: properly *strait* (*Bacon*). 3. Tense; tight.

Straight stem, in botany. Rectus caulis. Making one right line; not bent.—Erect is upright, or perpendicular to the horizon.—Rigid is stiff, difficult to bend.—Strict is both stiff and straight.

Straight. *ad.* (*strax*, Danish; *strack*, Dutch.) Immediately; directly (*Addison*).

To STRAI'GHTEN. *v. a.* (from *straight.*) 1. To make not crooked; to make straight (*Hooker*). 2. To make tense; to tighten.

STRAI'GHTNESS. *s.* (from *straight.*) Rectitude; the contrary to crookedness (*Bacon*).

STRA'IGHTWAY. *ad.* (*straight* and *way*, It is very often written *straightways*, and therefore is more properly written *straightwise.*) Immediately; straight (*Spenser. Bacon*).

To STRAIN. *v. a.* (*estreindre*, French.) 1. To squeeze through something (*Arbuthnot*). 2. To purify by filtration (*Bacon*). 3. To squeeze in an embrace (*Dryden*). 4. To sprain; to weaken by too much violence (*Spenser*). 5. To put to its utmost strength (*Dryden*). 6. To make straight or tense (*Bacon*). 7. To push beyond the proper extent (*Swift*). 8. To force; to constrain; to make uneasy or unnatural (*Shakspeare*).

To Strain. *v. n.* 1. To make violent efforts (*Daniel*). 2. To be filtred by compression (*Bacon*).

Strain. *s.* (from the verb.) 1. An injury by too much violence (*Grew*). 2. (ꞅꞇenᵹe, Saxon.) Race; generation; descent (*Chap.*).

3. Hereditary disposition (*Tillotson*). 4. A style or manner of speaking (*Swift*). 5. Song; note; sound (*Pope*). 6. Rank; character (*Dryden*). 7. Turn; tendency (*Hayward*). 8. Manner of speech or action (*Bacon*).

Strain, Stress, in mechanics, are terms indiscriminately used to express the force which is excited in any part of a machine or structure of any kind, tending to break it in that part. Thus every part of a rope is equally strained by the weight which it suspends. Every part of a pillar is equally strained by the load which it supports. A mill axle is equally twisted and strained in every part which lies between the part of the wheel actuated by the moving power, and the part which is resisted by the work to be performed. Every part of a lever or joist is differently strained by a force acting on a distant part.

It is evident that we cannot make the structure fit for its purpose, unless the strength in every part be at least equal to the stress laid on, or the strain excited in that part. It is no less plain, that if we are ignorant of the principles which determine this strain, both in intensity and direction, in relation to the magnitude and the situation of its remote cause, the only security we have for success is to give to every part of the assemblage such solidity, that we can leave no doubt of its sufficiency. But daily experience shows us that this vague security is in many cases uncertain, if we are thus ignorant. In all cases it is slovenly, unlike an artist, attended with useless expence, and in machines is attended with a loss of power, which is wasted in changing the motions of a needless load of matter.

It must therefore greatly tend to the improvement of all professions occupied in the erection or employment of such structures, to have a distinct notion of the strains to which their parts are exposed. Frequently, nay generally, these strains are not immediate, but arise from the action of forces on distant parts, by which the assemblage is strained, and there is a tendency to rupture in every part. This strain is induced on every part, and is there modified by fixed mechanical laws. These it is our business to learn; but our chief object in this investigation, is to determine the strength of materials which it is necessary to oppose in every part to this strain; and how to oppose this strength in such a manner that it shall be exerted to the best advantage. The notions of strain and strength therefore hardly admit of separation; for it is even by means of the strength of the intermediate parts, that the strain is propagated to, or excited in, the part under consideration.

Strain, in music. A word applied to those successive parts of a composition into which it is divided by double bars; the first strain lies between the first brace and the first double bar; the second strain between the first and second double bars; the third strain between the second and third double bars, and so on.

STRAI'NER. *s.* (from *strain.*) An instrument of filtration (*Bacon*).

STRAIT. *a.* (*estroit*, Fr. *stretto*, Italian.) 1. Narrow; close; not wide (*Hudibras*). 2. Close; intimate (*Sidney*). 3. Strict; rigorous (*Shakspeare*). 4. Difficult; distressful. 5. It is used in opposition to crooked; but is then more properly written *straight*.

Strait, a narrow channel or arm of the sea, shut up between lands on either side, and affording a passage out of one great sea into another. There are three kinds of straits. 1. Such as join one ocean to another. Of this kind are the straits of Magellan and Le Maire. 2. Those which join the ocean to a gulf: the straits of Gibraltar and Babelmandel are of this kind, the Mediterranean and Red Sea being only large gulfs. 3. Those which join one gulf to another; as the straits of Caffa, which joins the Palus Mæotis to the Euxine or Black Sea.

Strait, signifies also by a ready appropriation, distress or difficulty.

To Strait. *v. a.* (from the noun.) To put to difficulties (*Shakspeare*).

To STRAI'TEN. *v. a.* (from *strait.*) 1. To make narrow (*Sandys*). 2. To contract; to confine (*Clarendon*). 3. To make tight; to intend (*Dryden*). 4. To deprive of necessary room (*Clarendon*). 5. To distress; to perplex (*Ray*).

STRAITHA'NDED. *a.* (*straight* and *hand.*) Parsimonious; sparing; niggardly.

STRAITLA'CED. *a.* (*strait* and *lace.*) 1. Griped with stays (*Locke*). 2. Stiff; constrained; without freedom.

STRAI'TLY. *ad.* (from *strait.*) 1. Narrowly. 2. Strictly; rigorously (*Hooker*). 3. Closely; intimately.

STRAI'TNESS. *s.* (from *strait.*) 1. Narrowness (*King Charles*). 2. Strictness; rigour (*Hale*). 3. Distress; difficulty. 4. Want; scarcity (*Locke*).

STRAKE. (the obsolete preterit of *strike.*) Struck (*Spenser*).

Strakes, in the sea language, signify the uniform ranges of plants on the bottom, decks, and sides of ships. The garboard strake is that next the keel.

STRALSUND, a strong seaport of Upper Saxony, in Swedish Pomerania. In 1678, it surrendered to the elector of Brandenburg, after 1800 houses had been burnt in one night. Charles XII, in 1714, came hither after his return from Turkey; but Sweden not being able to hold out against five great powers, it was forced to submit in 1715. In 1720, it was restored to Sweden, but in a very poor condition. It is almost surrounded by the Baltic, and the lake Francen, and has a harbour separated from the isle of Rugen by a narrow strait. It is 15 miles N.W. of Gripswald, and 40 N.E. of Gustrow. Lon. 13. 28 E. Lat. 54. 17 N.

STRAMMONIUM. See Stramonium.

STRAM'ONIUM. (from *stramen*, straw; so called from its fibrous roots.) Common thorn-apple. Datura stramonium of Linnéus. Dàtura pericarpiis spinosis erectis ovatis foliis ovatis glabris. C. O. pentandria, monogynia. This plant has been long known as a powerful narcotic poison. In its recent state it has a bitterish taste, and a smell somewhat resembling that of poppies, especially if the leaves be rubbed between the fingers. Instances of the deleterious effects of the plant are numerous, more particularly of the seed. An extract prepared from the seeds is recommended by baron Stoerck in maniacal, epileptic, and convulsive affections. Externally the leaves of stramonium have been applied to inflammatory tumors and burns, and it is said with success; and they have been more recently smoked in cases of asthma, but with doubtful effects.

STRAND. *s.* (ꞅꞇꞃanꝺ, Saxon; *strande*, Dutch.) 1. The verge of the sea, or of any water (*Shakspeare*). 2. A twist of a rope.

To STRAND. *v. a.* (from the noun.) To drive or force upon the shallows (*Woodward*).

STRANGE. *a.* (*estrange*, French.) 1. Foreign; of another country (*Bacon*). 2. Not domestic (*Davies*). 3. Wonderful; causing wonder (*Milton*) 4. Odd; irregular (*Suckling*). 5. Unknown; new (*Milton*) 6. Remote (*Shakspeare*). 7. Uncommonly good or bad (*Tillotson*). 8. Unacquainted (*Bacon*).

STRANGE. *interj.* An expression of wonder.

To STRANGE. *v. n.* (from the adjective.) To wonder; to be astonished (*Glanville*).

STRA'NGELY. *ad.* (from *strange.*) 1. With some relation to foreigners (*Shakspeare*). 2. Wonderfully; in a way to cause wonder (*Sprat. Calamy*).

STRA'NGENESS. *s.* (from *strange*). 1. Foreignness; the state of belonging to another country (*Sprat*). 2. Uncommunicativeness; distance of behaviour (*Shakspeare*). 3. Remoteness from common manners or notions; uncouthness (*South*). 4. Mutual dislike (*Bacon*). 5. Wonderfulness; power of raising wonder (*Bacon*).

STRA'NGER. *s.* (*estranger*, French.) 1. A foreigner; one of another country (*Shakspeare*). 2. One unknown (*Pope*). 3. A guest; one no a domestic (*Milton*). 4. One unacquainted (*Dryden*). 5. One not admitted to any communication or fellowship (*Shaks.*).

To STRA'NGER. *v. a.* (from the noun.) To estrange; to alienate (*Shakspeare*).

STRANGFORD, a seaport of Ireland, in the county of Down, seated on the narrow channel that connects Lough Strangford with the Irish Sea, seven miles E. of Down. Lon. 5. 30 W. Lat. 54. 31 N.

STRANGFORD LOUGH, a deep inlet of the sea, in the county of Down, on the E. coast of Ireland. It is 17 miles long and five broad, and abounds with excellent fish, particularly smelts; and off the bar, about August, is a periodical herring fishery. The bar, or entrance into it from the Irish Sea, is three miles below Strangford. It contains 54 islands, that have names, and many others that are nameless. The burning of kelp profitably employs a great number of hands in these islands. Four of them are called Swan Islands, from the number of swans that frequent them.

To STRA'NGLE. *v. a.* (*strangulo*, Latin.) 1. To choak; to suffocate; to kill by intercepting the breath (*Ayliffe*). 2. To suppress; to hinder from birth or appearance.

STRA'NGLER. *s.* (from *strangle.*) One who strangles (*Shakspeare*).

STRANGLES, in veterinary science. The French and other foreign writers have compared the strangles in horses to the small-pox in men; and as the small-pox is more incident to children than to grown persons, so it has been observed by these writers, that the strangles chiefly affect colts and young horses, when they catch inveterate colds; which is very true, for horses are seldom subject to the strangles after six years old, though Gibson speaks of some horses that he knew to have had this distemper at seven and eight, and sometimes at nine or ten, though these instances, he says, are not very common. The strangles are also said to resemble the small-pox in this, that the disease never seizes horses oftener than once; whereas many other distempers, proceeding from common causes and accidents, will return as often as there are the proper causes to produce them. But however this be, it is probable that the strangles are a critical swelling, which, when it suppurates and breaks, discharges somewhat obnoxious to the constitutions of young horses, as they are usually rendered more healthful than they were before.

This disease begins with a swelling between the jaw-bones, sometimes pretty low among the muscles of the tongue, attended with great heat, pain, and inflammation, sometimes to such a degree, that a horse is scarcely able to swallow till the tumour suppurates.

Many colts have the strangles at grass, and the tumour comes to maturity and breaks, yielding a very plentiful discharge, without any other help than what nature affords; though in some cases there is very great malignity, with a purulent running at the nose, which is often dangerous. Those colts, however, that escape the strangles at grass, are liable, for the most part, to be seized when they are first taken up and put to business; and we often observe the change of diet, an alteration in the air, &c. bring on the strangles. Other causes may be, their catching cold, shedding their teeth, or whatever may induce pain, or bring on irritation at any critical time upon the throat and jaws.

When the strangles are coming upon a horse, he feels unusually hot, and sometimes very feverish, with a painful cough; some go quite off their stomachs, others are only dainty, or eat and drink with pain in chewing and swallowing. When the swelling begins on the inside of the jaw-bone, it is much longer in coming to maturity than when it begins more towards the middle. When the skin is tight and much stretched over the swelling, and that feels unusually dry and hot, the swelling will in that case be large before it breaks, and yield a plentiful discharge. When the swelling of the strangles rises between the jaw-bones, under the middle of the tongue, it is always the most favourable; but if it rises upwards among the glands, and is divided into several little tumours, it is not so kindly, but is apt to break in several places and at different times before it sinks, which renders the case more tedious and troublesome.

When the strangles begin directly in the upper part of the throat, towards the head of the wind-pipe and gullet, they hinder a horse sometimes from swallowing for several days, until the tumour grows full and large on the outside. This degree of the strangles is not altogether without danger of suffocation. The pressure made upon the head of the windpipe makes the horse's eye look fixed, as if he was convulsed, with his nose turned outwards, and his nostrils open for want of breath; which symptom continues till the tumour, growing ripe, breaks and runs off. But the worst and most dangerous kind of strangles is, when at the same time that a horse is swelled under the jaws, he runs also at the nose, which Gibson attributes either to some constitutional malignity, or to bad management; and this is what some call the false or bastard strangles.

This disease seldom proves dangerous, unless the efforts of nature are interrupted. Doing much in this case, says Gibson, is worse than doing too little, for the strangles seldom need any other help than to assist suppuration, by keeping the swelling always moist with camphorated hog's lard.

Some apply poultices to the strangles; but besides the trouble of applying them, and renewing them often, they frequently prove hurtful, by being composed of materials that are too stimulating, as turpentine, &c. Besides, if the poultices be not kept close, they are apt to chill the part, and to repel rather than promote a discharge of the humours, and this often leaves a dry and obstinate cough, or endangers the horse's eyes. Another error in the cure of the strangles, is opening the tumour before it comes to maturity, which defeats the purpose of nature, for there are found in that case callous swellings under the throat, with a gleeting ulcer, sometimes followed by a plentiful running at the nose, which, without very great care, will end in the glanders.

If the strangles begin with great pain and inflammation, as sometimes happens; if the horse's eyes be fixed, and he look convulsed; his neck much swoln, and his jaws stiff, with his nose turned outwards; it is nesessary to take away a sufficient quantity of blood, to foment and apply a bran poultice to the part, covering it with a thin woollen cloth; and this should be persevered in till it comes to maturity and breaks. Sometimes the inflammation is so great as to destroy the skin that incloses the matter, by which means it falls off in pieces, like an eschar made by a caustic, and exposes the interstices of the muscles, and contiguous glands. But here also nature will effect a cure, without any other help besides what has been already recommended; for the cavity is soon filled by a new growth of flesh, and covered with skin and hair, as perfect as at first. Sometimes the strangles break inwardly, and the matter is discharged chiefly by the mouth; and when it is so, the horse's mouth may be washed once or twice a day, with equal parts of brandy and vinegar, with a spoonful of honey to each pint. This, with warm soft diet, will perfect the cure without any other help, and the swelling on the outside will soon wear off.

In some cases, where there is little swelling and inflammation, the horse will eat and drink without pain; and though there be a collection of matter, yet when it is small, it sometimes continues long without breaking. When matter is formed in this way and may be felt by gentle pressure with the finger, Mr. Denny advises to open the tumour with a lancet in the most depending part.

STRANGULA'TION. *s.* (from *strangle.*) The act of strangling; suffocation; the state of being strangled (*Brown*).

STRANGURY. (ςραγγȣρια, from ςράγξ, a drop, and ȣρον, urine.) A difficulty of making water, attended with pain and dripping. See DYSURIA and ISCHURIA.

STRANRAWER, a borough in Wigtonshire, situate on Loch Ryan. It has a manufacture of linen, and is eight miles W. of Glenluce. Lon. 5. 15 W. Lat. 55. 0 N.

STRAP. *s.* (*stroppe*, Dutch.) A narrow long slip of cloth or leather (*Addison*).

To STRAP. *v. a.* To beat with a strap.

STRAPPA'DO. *s.* Chastisement by blows (*Shakspeare*).

STRA'PPING. *a.* Vast; large; bulky.

STRASBURG, a commercial city of France, in the department of Lower Rhine. It is situate near the Rhine; and the river Ill runs through it, and forms many canals. There are six bridges of communication between the different quarters of the city; and the inhabitants, exclusive of the garrison, are computed to be 46,000. The principal structures are built of a red stone, dug from the quarries which are along the Rhine. This town, formerly imperial, was taken by Lewis XIV. in 1681. The citadel and fortifications, which he constructed, have been so much augmented, that Strasburg may be considered as one of the strongest places in Europe. It was confirmed to France by the peace of Ryswick in 1697. The town is entered by six gates. Before the revolution of 1789, it was an archiepiscopal see, but is now a bishopric. In the cathedral is a clock, which shows the motions of the constellations, the revolutions of the sun and moon, the days of the week, the hours, &c. The spire of the cathedral is 549 feet in height. Strasburg is a place of considerable commerce, and has manufactures of tobacco, porcelain, steel, lace, carpets, cloth, leather, &c. It is 65 miles N. of Basel, and 75 E. of Nancy. Lon. 7. 45 E. Lat. 48. 35 N.

STRATA, in mineralogy, the plural of STRATUM, which see.

STRATUM. (*stratum*, Latin, a bed.) In mineralogy, a tunic or layer of any of those substances which enter into the solid crust or shell of the globe. The Latin plural of *stra-*

tum is *strata*, which is also in equal use in mineralogical technology. These terms are often employed in a popular and looser sense as synonyms with *bed* and *beds*; but in a strict and scientific sense *bed* imports a smaller range of mineral matter than *stratum*.

In a comprehensive view the solid surface of the earth is composed of strata, veins, and cavities: the first constituting massy layers of rocks more or less simple, and more or less extensive: the second comprehending those transverse sections which are so frequently to be met with in them, consisting either of simple fissures, or of some other rock or material filling up the fissure, often from the deepest bottom of the stratum to its utmost surface, as though it had been exposed to the action of some enormous force that had split the stratum asunder from its top to its base, antecedently to the creation, or at least to the arrival of the veiny matter in the fissure hereby produced. Cavities are open spaces, of different forms and diameters, existing at almost every depth in the subterranean regions, produced by volcanoes, earthquakes, the attrition of rivers, and a variety of other causes, some of them known, but by far the greater part unknown.

According to the Wernerian system the solid crust of the earth consists of five general classes of formations, each comprising a considerable number of strata, which lie more or less regularly over each other, and which, as we have already observed in the article Rocks, he denominates primitive, transition, floetz or horizontal, alluvial and volcanic. He conceives that all these, and all the various strata which appertain to each separately, were originally produced in the most perfect order, every stratum occupying its proper and ascending post from that of granite, which is supposed uniformly to lie lowest, to earths, lavas, and tufas, which are supposed to lie highest: but that a variety of causes, as general or partial concussions and disruptions of the globe's solid surface, general or partial deluges, &c. have produced a considerable change in their proper arrangement and superposition; although from the extensive regularity that still exists, we have sufficient reason, in his judgment, to infer the more perfect and universal regularity that existed at first. All the different kinds of rocks that enter into the five classes or formations to which we just alluded may, on a gross average, be taken at about sixty; and in the different strata which they compose by their superposition, we often meet with smaller strata or layers of other rocks or substances imbedded as though the latter had dropped into the former while the larger strata were in a soft or fluid state. It is to these internal and smaller strata or layers that the term *beds* is peculiarly appropriated. See Geology.

STRA'TAGEM. *s.* (στρατηγημα.) 1. An artifice in war; a trick by which an enemy is deceived (*Shakspeare*). 2. An artifice; a trick by which some advantage is obtained (*Pope*).

STRATFORD, a village in Suffolk, 12 miles S.W. of Ipswich. It has a share in the woollen manufacture, and stands on the Stour, over which is a bridge into Essex.

Stratford, a village in Essex, three miles E.N.E. of London. It is separated from Bow, in Middlesex, by the river Lea, over which is a bridge, said to be the most ancient stone one in England.

Stratford on Avon, a town in Warwickshire, governed by a mayor, with a market on Thursday. It is memorable as the birthplace of Shakspeare, who was buried here in 1616. It stands on the Avon, over which is a long bridge, eight miles S.W. of Warwick, and 93 N.W. of London.

Stratford (Fenny), a town in Buckinghamshire, with a market on Monday, seated on the Lyssel, and the Roman Watling-street, 12 miles E. of Buckingham, and 45 N.W. of London.

Stratford (Stoney), a town in Buckinghamshire, with a market on Friday. Here are two churches, and a cross built by Edward I. in memory of his queen Eleanor. In 1743 a fire happened, which destroyed 150 houses. The inhabitants are principally lace-makers. It is seated on the Ouse, and the Roman Watling-street, eight miles N.E. of Buckingham, and 52 N.W. of London.

STRATHAVEN, a town of Scotland, in Lanerkshire, with a manufacture of cotton, seated on the Aven, six miles S. of Hamilton, and 12 W. of Lanerk.

STRATHMORE, a river of Scotland, in Sutherlandshire, which flows into a bay of the North sea, called Loch Hope. On its banks are the ruins of a curious ancient fort, called Dornadilla.

STRATHY, a river of Scotland, in Sutherlandshire, which issues from a small lake, and flows into a bay of the North sea, sheltered to the W. by a large promontory, to which it gives name.

STRATHSPEY, a lively Scotch dance, the tune of which is generally written in common time.

To STRA'TIFY. *v. a.* (*stratifier*, French; from *stratum*, Latin.) To range in beds or layers.

STRATIOMYS, in the entomology of Fabricius, a tribe of the genus Musca, which see.

STRATIOTES. Water-soldier. In botany, a genus of the class monœcia, order icosandria. Spathe two-leaved; perianth superior, three-cleft; petals three; nectaries twenty, anther-shaped, in a ring. Fem. styles six; berry inferior, six-celled. Three species; two natives of the East Indies; one indigenous to the ditches of our own country, S. aloides; leaves ensiform, triangular, with prickly serratures; flowers white, floating on the water, and blossoming in June.

STRATO, or Straton. The most remarkable of this name were, a king of the island Aradus, received into alliance by Alexander.—A king of Sidon, dependent upon Darius.—A philosopher of Lampsacus, disciple and successor to the school of Theophrastus, about 289 years before the Christian era. He supported that nature was inanimate, and that there was no god but nature. He was preceptor to Ptolemy Philadelphus, who rewarded his labours with unbounded liberality. He wrote different treatises, all now lost.

STRATTON, a town in Cornwall, with a market on Tuesday, 18 miles N.N.W. of Launceston, and 222 W. by S. of London.

STRAUBING, a town of Bavaria, capital of a territory of the same name, with a castle. It has broad streets, handsome churches, and fine convents. It was taken, in 1743, by the Austrians, who demolished the fortifications; but it was restored in 1745. It is seated on the Danube, 22 miles S.E. of Ratisbon, and 68 N.E. of Munich. Lon. 12. 28 E. Lat. 48. 50 N.

STRAW. *s.* (ꞅꞇꞃeoƿ, Saxon; *stróo*, Dut.) 1. The stalk on which corn grows, and from which it is thrashed (*Bacon*). 2. Any thing proverbially worthless (*Hudibras*).

STRAWBERRY, in botany. See Fragaria.

Strawberry blite, in botany. See Blitum.

Strawberry spinach, in botany. See Blitum.

Strawberry tree, in botany. See Arbutus.

STRA'WBUILT. *a.* (*straw* and *built.*) Made up of straw (*Milton*).

STRA'WCOLOURED. *a.* (*straw* and *colour.*) Of a light yellow (*Shakspeare*).

STRA'WWORM. *s.* (*straw* and *worm.*) A worm bred in straw.

STRA'WY. *a.* (from *straw.*) Made of straw; consisting of straw (*Boyle*).

To STRAY. *v. n.* (*stroe*, Danish, to scatter; *stravviare*, Italian, to wander.) 1. To wander; to rove (*Pope*). 2. To rove out of the way; to range beyond the proper limits (*Spenser*). 3. To err; to deviate from the right (*C. Pr.*).

To Stray. *v. a.* To mislead: obsolete (*Shakspeare*).

Stray. *s.* (from the verb.) 1. Any creature wandering beyond its limits; any thing lost by wandering (*Addison*). 2. Act of wandering (*Shakspeare*).

STREAK. *s.* (ꞅꞇꞃıce, Sax. *streke*, Dutch.) A line of colour different from that of the ground (*Dryden*).

To Streak. *v. a.* (from the noun.) 1. To stripe; to variegate in hues; to dapple (*Prior*). 2. To stretch: obsolete (*Chapman*).

STRE'AKY. *a.* (from *streak.*) Striped; variegated by hues (*Dryden*).

STREAM. *s.* (ꞅꞇꞃeam, Sax. *straum*, Islan.) 1. A running water; the course of running water; current (*Dryden*). 2. Any thing issuing from a head, and moving forward with continuity of parts (*Atterbury*). 3. Any thing forcible and continued (*Raleigh*). 4. Course; current (*Shakspeare*).

To Stream. *v. n.* (*streyma*, Islandic.) 1. To flow; to run in a continuous current (*Milton*). 2. To emit a current; to pour out water in a stream; to be overflown (*Pope*). 3. To issue forth with continuance, not by fits (*Shakspeare*).

To Stream. *v. a.* To mark with colours or embroidery in long tracks (*Bacon*).

Stream tin, in mineralogy. See Stannum.

STREA'MER. *s.* (from *stream.*) An ensign; a flag; a pennon; any thing flowing loosely from a stock (*Prior*).

STREA'MY. *a.* (from *stream.*) 1. Abounding in running water (*Prior*). 2. Flowing with a current (*Pope*).

STREET. *s.* (ꞅꞇꞃæꞇ, Sax. *straet*, Dutch.) 1. A way, properly a paved way between two rows of houses (*Sandys*). 2. Proverbially, a public place (*Rogers*).

STRE'ETWALKER. *s.* (*street* and *walk.*) A common prostitute, that offers herself to sale in the open street.

STRELITZ (New), a town of Lower Saxony, capital of the duchy of Mecklenburg-Strelitz. It owes its origin to the destruction of the ducal palace, in Old Strelitz; in consequence of which, in 1713, the duke began to erect a magnificent palace, two miles from the site of the old one, at a place called Glienke, which was before his hunting seat; and in 1733, he founded a town adjoining to the palace, and ordered it to be called New Strelitz. The centre is a spacious market-place, and thence a number of streets branch out in straight lines; the chief street leads to the palace, and the next to a pleasant lake. It is seated among lakes, 55 miles S.E. of Gustrow, and 56 N. by W. of Berlin. Lon. 13. 18 E. Lat. 53. 21 N.

Strelitz (Old), a small town of the duchy of Mecklenburg, the residence of the younger branch of that house, till the castle was burnt down in 1712. See the preceding article.

STRELITZIA, in botany, a genus of the class pentandria, order monogynia. Spathe general and partial; calyxless; corol three-petalled; nectary three-leaved, inclosing the parts of fructification; capsule three-celled; the cells many-seeded. Two species, natives of the Cape; one of which, S. reginæ, cannaleaved strelitzia, is a very magnificent plant, and cultivated in our hot-houses. Its leaves are all radical, oblong, very entire, with parallel ribs; nectary blue: general spathe a span long, green outside, purple at the edges; petals yellow, four inches long. It is only to be raised from seeds brought from the Cape.

STRENGTH. *s.* (ꞅꞇꞃenᵹð, Saxon.) 1. Force; vigour; power of the body (*Dryden*). 2. Power of endurance; firmness; durability; toughness; hardness (*Milton*). 3. Vigour, or power, of any kind (*Addison*). 4. Pureness; fastness (*Shakspeare*). 5. Support; security (*Milton*). 6. Power of mind; force of any mental faculty (*Locke*). 7. Spirit; animation (*Milton*). 8. Vigour of writing; nervous diction (*Pope*). 9. Potency of liquors. 10. Fortification; fortress (*Ben Jonson*). 11. Support; maintenance of power (*Sprat*). 12. Legal force; validity; security. 13. Confidence imparted (*Addison*). 14. Armament; force; power (*Clarendon*). 15. Persuasive prevalence; argumentative force (*Hooker*).

To STRENGTH. *v. a.* To strengthen (*Dan.*).

STRENGTH, in physiology, the same with force.

Men may apply their strength several ways in working a machine. A man of ordinary strength, turning a roller by the handle, can act for a whole day against a resistance equal to thirty pounds weight; and if he works ten hours a day, he will raise a weight of thirty pounds through three feet and a half in a second of time; or if the weight be greater, he will raise it so much less in proportion. But a man may act, for a small time, against a resistance of fifty pounds or more. If two men work at a windlass, or roller, they can more easily draw up seventy pounds, than one man can thirty pounds, provided the elbow of one of the handles be at right angles to that of the other. And with a fly, or heavy wheel, applied to it, a man may do one-third part more work; and for a little while he can act with a force, or overcome a continual resistance, of eighty pounds; and work a whole day when the resistance is but forty pounds. Men used to bear loads, such as porters, will carry, some one hundred and fifty pounds, others two hundred or two hundred and fifty pounds, according to their strength. A man can draw but about seventy or eighty pounds horizontally; for he can but apply about half his weight. If the weight of a man be one hundred and forty pounds, he can act with no greater force in thrusting horizontally, at the height of his shoulders, than twenty-seven pounds.

As to horses: a horse is, generally speaking, as strong as five men. A horse will carry two hundred and forty or two hundred and seventy pounds. A horse draws to greatest advantage when the line of direction is a little elevated above the horizon, and the power acts against his breast: and he can draw two hundred pounds for eight hours a day, at two miles and a half an hour. If he draw two hundred and forty pounds, he can work but six hours, and not go quite so fast. And in both cases, if he carries some weight, he will draw the better for it. And this is the weight a horse is supposed to be able to draw over a pulley out of a well. But in a cart, a horse may draw one thousand pounds, or even double that weight, or a ton weight, or more.

For more on the subject of animal strength, consult the treatises on Mechanics by Emerson, and Gregory, and the 1st vol. of Professor Playfair's Outlines of Natural Philosophy.

Emerson has particularly treated of the strength of bodies depending on their dimensions and weight. In the general scholium after his propositions on this subject, he adds; If a certain beam of timber be able to support a given weight; another beam, of the same timber, similar to the former, may be taken so great, as to be able but just to bear its own weight: while any larger beam cannot support itself, but must break by its own weight; but any less beam will bear something more. For the strength being as the cube of the depth; and the stress, being as the length and quantity of matter, is at the 4th power of the depth; it is plain therefore, that the stress increases in a greater ratio than the strength. Whence it follows, that a beam may be taken so large, that the stress may far exceed the strength: and that, of all similar beams, there is but one that will just support itself, and nothing more. And the like holds true in all machines, and in all animal bodies. And hence there is a certain limit, in regard to magnitude, not only in all machines and artificial structures, but also in natural ones, which neither art nor nature can go beyond; supposing them made of the same matter, and in the same proportion of parts.

Hence it is impossible that mechanic engines can be increased to any magnitude at pleasure. For when they arrive at a particular size, their several parts will break and fall asunder by their weight. Neither can any buildings of vast magnitudes be made to stand, but must fall to pieces by their great weight, and go to ruin.

It is likewise impossible for nature to produce animals of any vast size at pleasure: except some sort of matter can be found, to make the bones of, which may be so much harder and stronger than any hitherto known: or else that the proportion of the parts be so much altered, and the bones and muscles made thicker in proportion; which will make the animal distorted, and of a monstrous figure, and not capable of performing any proper actions. And being made similar and of common matter, they will not be able to stand or move; but, being burthened with their own weight, must fall down. Thus, it is impossible that there can be any animal so large as to carry a castle upon his back; or any man so strong as to remove a mountain, or pull up a large oak by the roots: nature will not admit of these things; and it is impossible that there can be animals of any sort beyond a determinate size.

Fishes may indeed be produced to a larger size than land animals; because their weight is supported by the water. But yet even these cannot be increased to immensity, because the internal parts will press upon one another by their weight, and destroy their fabric.

On the contrary, when the size of animals is diminished, their strength is not diminished in the same proportion as the weight. For which reason a small animal will carry far more than a weight equal to its own, whilst a great one cannot carry so much as its weight. And hence it is that small animals are more active, and run faster, jump farther, or perform any motion quicker, for their weight, than large animals: for the less the animal, the greater the proportion of the strength to the stress. And nature seems to know no bounds as to the smallness of animals, at least in regard to their weight.

Neither can any two unequal and similar machines resist any violence alike, or in the same proportion; but the greater will be more hurt than the less. And the same is true of animals; for large animals by falling break their bones, while lesser ones, falling higher, receive no damage. Thus a cat may fall two or three yards high, and be no worse, and an ant from the top of a tower.

It is likewise impossible in the nature of things, that there can be any trees of immense size; if there were any such, their limbs, boughs, and branches, must break off and fall down by their own weight. Thus it is impossible there can be an oak a quarter of a mile high; such a tree cannot grow or stand, but its limbs will drop off by their weight. And hence also smaller plants can better sustain themselves than large ones.

As to the due proportion of strength in several bodies, according to their particular positions, and the weights they are to bear; he farther observes that, If a piece of timber is to be pierced with a mortoise-hole, the beam will be stronger when it is taken out of the middle, than when taken out of either side. And in a beam supported at both ends, it is stronger when the hole is made in the upper side than when made in the under, provided a piece of wood is driven hard in to fill up the hole. See BEAM.

To form an idea of the strength, or resistance, or renitency, of the parts of bodies, suppose a cylindrical one suspended vertically by one end. Here all its parts, being heavy, tend downwards, and endeavour to separate the two contiguous planes or surfaces where the body is the weakest; but all the parts of them resist this separation by the force with which they cohere, or are bound together. Here then are two opposite powers; viz. the weight of the cylinder, which tends to break it; and the force of cohesion of the parts, which resists the fracture.

If now the base of the cylinder be increased, without increasing its length; it is evident that both the resistance and the weight will be increased in the same ratio as the base; and hence it appears that all cylinders of the same matter and length, whatever their bases be, have an equal resistence, when vertically suspended.

But if the length of the cylinder be increased, without increasing its base, its weight is increased, while the resistance or strength continues unaltered; consequently the lengthening has the effect of weakening it, or increases its tendency to break.

Hence to find the greatest length a cylinder of any matter may have, when it just breaks with the addition of another given weight, we need only take any cylinder of the same matter, and fasten to it the least weight that is just sufficient to break it; and then consider how much it must be lengthened, so that the weight of the part added, together with the given weight, may be just equal to that weight, and the thing is done. Thus, let l denote the first length of the cylinder, c its weight, g the given weight the lengthened cylinder is to bear, and w the least weight that breaks the cylinder l, also x the length sought;

then as $l : x :: c : \frac{cx}{l} =$ the weight of the longest cylinder sought; and this, together with the given weight g, must be equal to c together with the weight w; hence then $\frac{cx}{l} + g = c + w$; therefore $x = \frac{c+w-g}{c} l =$ the whole length of the cylinder sought. If the cylinder must just break with its own weight, then is $g = 0$, and in that case $x = \frac{c+w}{c} l$ is the whole length that just breaks by its own weight. By this means Galileo found that a copper wire, and of consequence any other cylinder of copper, might be extended to 4801 braccios or fathoms of 6 feet deep.

If the cylinder be fixed by one end into a wall, with the axis horizontally; the force to break it, and its resistance to fracture, will here be both different; as both the weight to cause the fracture, and the resistance of the fibres to oppose it, are combined with the effects of the lever; for the weight to cause the fracture, whether of the weight of a beam alone, or combined with an additional weight hung to it, is to be supposed collected into the centre of gravity, where it is considered as acting by a lever equal to the distance of that centre beyond the face of the wall where the cylinder or other prism is fixed; and then the product of the said whole weight and distance will be the momentum or force to break the prism. Again, the resistance of the fibres may be supposed collected into the centre of the transverse section, and all acting there at the end of a lever equal to the vertical semidiameter of the section, the lowest point of that diameter being immoveable, and about which the whole diameter turns when the prism breaks; and hence the product of the adhesive force of the fibres multiplied by the said semidiameter will be the momentum of resistance, and must be equal to the former momentum when the prism just breaks.

Hence, to find the length a prism will bear, fixed horizontally, before it breaks, either by its own weight, or by the addition of any adventitious weight; take any length of such a prism, and load it with weights till it just break. Then, put

$l =$ the length of this prism,
$c =$ its weight,
$w =$ the weight that breaks it,
$a =$ distance of weight w,
$g =$ any given weight to be borne,
$d =$ its distance,
$x =$ the length required to break.

Then $l : x :: c : \frac{cx}{l}$ the weight of the prism x, and $\frac{cx}{l} \times \frac{1}{2} x = \frac{cx^2}{2l} =$ its momentum; also

$dg =$ the momentum of the weight g; therefore $\frac{cx^2}{2l} + dg$ is the momentum of the prism x and its added weight. In like manner $\frac{1}{2}cl + aw$ is that of the former or short prism and the weight that brake it; consequently $\frac{cx^2}{2l} + dg = \frac{1}{2}cl + aw$, and $x = \sqrt{\frac{aw + \frac{1}{2}cl - dg}{c} \times 2l}$ is the length sought, that just breaks with the weight g at the distance d. If this weight g be nothing, then $x = \sqrt{\frac{aw + \frac{1}{2}cl}{c} \times 2l}$ is the length of the prism that just breaks with its own weight.

If two prisms of the same matter, having their bases and lengths in the same proportion, be suspended horizontally; it is evident that the greater has more weight than the lesser, both on account of its length, and of its base; but it has less resistance on account of its length, considered as a longer arm of a lever, and has only more resistance on account of its base; therefore it exceeds the lesser in its momentum more than it does in its resistance, and consequently it must break more easily.

Hence appears the reason why, in making small machines and models, people are apt to be mistaken as to the resistance and strength of certain horizontal pieces, when they come to execute their designs in large, by observing the same proportions as in the small.

When the prism, fixed vertically, is just about to break, there is an equilibrium between its positive and relative weight; and consequently those two opposite powers are to each other reciprocally as the arms of the lever to which they are applied, that is, as half the diameter to half the axis of the prism. On the other hand, the resistance of a body is always equal to the greatest weight which it will just sustain in a vertical position, that is, to its absolute weight. Therefore, substituting the absolute weight of the resistance, it appears, that the absolute weight of a body, suspended horizontally, is to its relative weight, as the distance of its centre of gravity from the fixed point or axis of motion, is to the distance of the centre of gravity of its base from the same.

The discovery of this important truth, at least of an equivalent to it, and to which this is reducible, we owe to Galileo. On this system of resistance of that author, Mariotte made an ingenious remark, which gave birth to a new system. Galileo supposes that where the body breaks, all the fibres break at once; so that the body always resists with its whole absolute force, or the whole force that all its fibres have in the place where it breaks. But Mariotte, finding that all bodies, even glass itself, bend before they break, shows that fibres are to be considered as so many little bent springs, which never exert their whole force, till stretched to a certain point, and never break till entirely unbent. Hence those nearest the fulcrum of the lever, or lowest point of the fracture, are stretched less than those farther off, and consequently employ a less part of their force, and break later. This consideration only takes place in the horizontal situation of the body: in the vertical, the fibres of the base all break at once; so that the absolute weight of the body must exceed the united resistance of all its fibres; a greater weight is therefore required here than in the horizontal situation, that is, a greater weight is required to overcome their united resistance, than to overcome their several resistances one after another.

Varignon has improved on the system of Mariotte, and some later authors, as Buffon, Robison, Girard, &c. have done much towards perfecting the theory. For more on this branch of the subject we refer to Gregory's Mechanics, vol. i. book 1. Hutton's Course, vol. iii. and Girard's treatise on the Resistance of Solids.

To STRE'NGTHEN. *v. a.* (from *strength.*) 1. To make strong. 2. To confirm; to establish (*Temple*). 3. To animate; to fix in resolution (*Deuteronomy*). 4. To make to increase in power or security (*Shakspeare*).

To STRE'NGTHEN. *v. n.* To grow strong (*Otway*).

STRE'NGTHENER. STRE'NGTHNER. *s.* (from *strengthen.*) 1. That which gives strength; that which makes strong (*Temple*). 2. (In medicine.) *Strengtheners* add to the bulk and firmness of the solids. See CORROBORANTS.

STRE'NGTHLESS. *a.* 1. Wanting strength; deprived of strength (*Shakspeare*). 2. Wanting potency; weak (*Boyle*).

STRE'NUOUS. *a.* (*strenuus*, Latin.) 1. Brave; bold; active; valiant (*Milton*). 2. Zealous; vehement (*Swift*).

STRE'NUOUSLY. *ad.* (from *strenuous.*) 1. Vigorously; actively (*Brown*). 2. Zealously; vehemently; with ardour (*Swift*).

STRE'PEROUS. *a.* (*strepo*, Latin.) Loud; noisy (*Brown*).

STREPTIUM, in botany, a genus of the class didynamia, order angiospermia. Calyx swelling, five-toothed; corol with a spiral tube, and five-parted border; nuts two-celled, wrinkled externally. One species only, an East Indian plant, with woody stem, square rough branches; hearted serrate leaves, rough on both sides; and terminal racemes.

STRESS. *s.* (ꞅꞇꞃece, Saxon; violence.) 1. Importance; important part (*Locke*). 2. Importance imputed; weight ascribed (*Atterbury*). 3. Violence; force, either acting or suffered (*Locke*).

To STRESS. *v. a.* To distress; to put to hardships or difficulties (*Spenser*).

To STRETCH. *v. a.* (ꞅꞇꞃecan, Saxon.) 1. To extend; to spread out to a distance (*Exod.*). 2. To elongate, or strain to a greater space (*Milton*). 3. To expand; to display (*Tillotson*). 4. To strain to the utmost (*Shakspeare*). 5. To make tense (*Smith*). 6. To carry by violence further than is right; to strain: as, to *stretch* credit.

To STRETCH. *v. n.* 1. To be extended (*Cowley*). 2. To bear extension without rupture (*Boyle*). 3. To sally beyond the truth (*Government of the Tongue*).

STRETCH. *s.* (from the verb.) 1. Extension;

reach; occupation of more space (*Ray*). 2. Force of body extended (*Dryden*). 3. Effort; struggle: from the act of running (*Addison*). 4. Utmost extent of meaning (*Atterbury*). 5. Utmost reach of power (*Granville*).

STRE'TCHER. *s.* (from *stretch.*) 1. Any thing used for extension (*Moxon*). 2. The timber against which the rower plants his feet (*Dryden*).

STRETTO. (Ital.) Shortened. In music, a word formerly used to signify that the movement to which it was prefixed was to be performed in a quick, concise style.

To STREW. *v. a.* (*strawan*, Goth. *stroyen*, Dutch; ꞅꞇꞃeaƿian, Saxon; *strawen*, Germ. *strôer*, Dan.) It is sometimes written *strow*, and perhaps best, as it reconciles etymology with pronunciation. (See STROW.) 1. To spread by being scattered (*Pope*). 2. To spread by scattering (*Shaksp.*). 3. To scatter loosely (*Exodus*).

STRE'WMENT. *s.* (from *strew.*) Any thing scattered in decoration (*Shakspeare*).

STRI'Æ. *s.* (Latin.) The small channels in the shells of cockles and scollops (*Boyle*).

STRIATE, in botany, striated or streaked. Striatus caulis, culmus. Lineis tenuissimis excavatis inscriptus. Stalk or culm; marked or scored with superficial or very slender lines. In the explanation of the striated leaf the word *parallel* is added.

STRI'ATURE. *s.* (from *striæ*; *strieure*, French.) Disposition of striæ (*Woodward*).

STRICK. *s.* (ϛριγξ; *strix*, Latin.) A bird of bad omen (*Spenser*).

STRI'CKEN. The ancient participle of *strike*.

STRI'CKLE. *s.* That which strikes the corn, to level it with the bushel (*Ainsworth*).

STRICT. *a.* (*strictus*, Latin.) 1. Exact; accurate; rigorously nice (*Milton*). 2. Severe; rigorous; not mild (*Locke*). 3. Confined; not extensive (*Hooker*). 4. Close; tight (*Dryden*). 5. Tense; not relaxed (*Arbuthnot*).

STRICT. (*stringo*, to tie fast.) In botany, stiff and straight. See STRAIGHT.

Strict, however, in Mr. Martyn's opinion, will not do in English, and we do not recollect that we have any one word to express this idea. Straight is put for rectus, and stiff for rigidus. Linnéus in one place refers stricta (folia) to recta; adding, that it strengthens the signification, and means the same as rectissima. Philos. Bot. p. 219. In another place (p. 233) he opposes strictus to laxus, flaccidus. In Term. Bot. 28, erectus is explained to be a stem rising in almost a perpendicular direction; strictus (29), to be altogether perpendicular without bending. We do not conceive that this term has any thing to do with perpendicularity of direction.

It is applied to the stem in astragalus sulcatus, &c.; to the culm, branch, leaves, in campanula panula; and to the peduncle.

STRI'CTLY. *ad.* (from *strict.*) 1. Exactly; with rigorous accuracy (*Burnet*). 2. Rigorously; severely; without remission or indulgence (*Rogers*). 3. Closely; tightly; with tenseness.

STRI'CTNESS. *s.* (from *strict.*) 1. Exactness; rigorous accuracy; nice regularity (*Rogers*). 2. Severity; rigour (*Bacon*). 3. Closeness; tightness; not laxity.

STRI'CTURE. *s.* (from *strictura*, Latin.) 1. A stroke; a touch (*Hale*). 2. Contraction; closure by contraction (*Arbuthnot*). 3. A slight touch upon a subject; not a set discourse (*Hammond*).

STRICTURE. (from *stringo*, to tie fast.) In medicine, a contraction, or closure of some canal or hollow organ of the body.

STRICTURE OF THE URETHRA, in medicine, a contraction or closure of this canal from morbid irritation or other cause.

STRIDE. *s.* (ꞅꞇꞃæꝺe, Sax.) A long step; a step taken with great violence; a wide divarication of the legs (*Swift*).

To STRIDE. *v. n.* preterit *strode* or *strid*; participle pass. *stridden*. (from the noun.) 1. To walk with long steps (*Dryden*). 2. To stand with the legs far from each other.

To STRIDE. *v. a.* To pass by a step (*Arb.*).

STRI'DULOUS. *a.* (*stridulus*, Lat.) Making a small noise (*Brown*).

STRI'FE. *s.* (from *strive.*) 1. Contention; contest; discord (*Judges*). 2. Contest of emulation (*Congreve*). 3. Opposition; contrariety; contrast (*Shakspeare*).

STRI'FEFUL. *a.* (*strife* and *full.*) Contentious; discordant (*Dr. Maine*).

STRINGA. (from *strigo* for *stringo.*) In botany. In Term. Bot. 363, strigæ are thus described—pili rigidiusculi planiusculi. In Philos. Bot. Linnéus only says—arcent setis rigidis animalcula & linguas; and gives for examples cactus, malpighia, hibiscus, rubus. They seem to be stiffish, flattish bristles; and from the derivation we should suppose that they grow in a sort of order or rank. Their use is to keep off the smaller animals, and the tongues of larger ones, from injuring the plants. We have no English name for this term.

STRI'GMENT. *s.* (*strigmentum*, Latin.) Scraping; recrement (*Brown*).

STRIGOUS. (from *strigo.*) In botany, applied to the leaf; strigosum folium. Aculeis lanceolatis rigidis. Set with stiff lanceolate bristles. Term. Bot. 246. In Philos. Bot. Linnéus refers to hespidum. Dr. Berkenhout interprets it, lank, lean, or drawn up as if hidebound; we know not on what authority, but probably misled by one sense of the verb strigare, which is, to leave a furrow unfinished in ploughing; whence a horse or ox unable to go through his work was called strigosus.

To STRIKE. *v. a.* preterit *struck* or *strook*; participle passive *struck*, *strucken*, *stricken*, or *strook*. (aꞅꞇꞃican, Saxon; *stricker*, Danish.) 1. To act upon by a blow; to hit with a blow (*Shakspeare*). 2. To punish; to afflict (*Proverbs*). 3. To dash; to throw by a quick motion (*Exodus*). 4. To notify by sound (*Collier*). 5. To stamp; to impress (*Locke*). 6. To contract; to lower: used only in the phrases to *strike sail*, or to *strike a flag*. 7.

To alarm; to put into emotion (*Waller*). 8. To make a bargain (*Dryden*). 9. To produce by a sudden action (*Bacon*). 10. To affect suddenly in any particular manner (*Collier*). 11. To cause to sound by blows (*Knolles*). 12. To forge; to mint (*Arbuthnot*). 13. It is used in the participle for *advanced in years* (*Shakspeare*). 14. *To* Strike *off.* To erase from a reckoning or account (*Pope*). 15. *To* Strike *off.* To separate by a blow, or any sudden action (*Burnet*). 16. *To* Strike *out.* To produce by collision (*Dryden*). 17. *To* Strike *out.* To blot; to efface (*Brown*). 18. *To* Strike *out.* To bring to light. 19. *To* Strike *out.* To form at once by a quick effort (*Pope*).

To Strike. *v. n.* 1. To make a blow (*Dryden*). 2. To collide; to clash (*Bacon*). 3. To act by repeated percussion (*Waller*). 4. To sound by the stroke of a hammer (*Shakspeare*). 5. To make an attack (*Dryden*). 6. To act by external influx (*Locke*). 7. To sound with blows (*Shakspeare*). 8. To be dashed; to be stranded (*Knolles*). 9. To pass or act with a quick or strong effect (*Dryden*). 10. To pay homage, as by lowering the sail (*Shakspeare*). 11. To be put by some sudden act or motion into any state; to break forth (*G. of Tongue*). 12. *To* Strike *in with.* To conform; to suit itself to; to join with at once (*Norris*). 13. *To* Strike *out.* To spread or rove; to make a sudden excursion (*Burnet*).

Strike. *s.* A bushel; a dry measure of capacity; four pecks (*Tusser*).*

STRI′KEBLOCK. *s.* A plane shorter than the jointer, used for the shooting of a short joint (*Moxon*).

STRI′KER. *s.* (from *strike.*) Person or thing that strikes (*Sandys. Digby*).

STRI′KING. *part. a.* Affecting; surprising.

STRING. *s.* (ꞅꞇꞃınᵹ, Sax. *streng*, Germ.) 1. A slender rope; a small cord; any slender and flexible band (*Wilkins*). 2. A thread on which any things are filed (*Stillingfleet*). 3. Any set of things filed on a line (*Addison*). 4. The chord of a musical instrument. (See Chord.) 5. A small fibre (*Bacon*). 6. A nerve; a tendon (*Shakspeare*). 7. The nerve or line of the bow (*Psalms*). 8. Any concatenation or series: as, *a string of propositions.* 9. *To have two* Strings *to the Bow.* To have two views or two expedients (*Hudibras*).

To String. *v. a.* preterit *strung*: participle passive *strung*. (from the noun.) 1. To furnish with strings (*Gay*). 2. To put a stringed instrument in tune (*Addison*). 3. To file on a string (*Spectator*). 4. To make tense (*Dry.*).

STRI′NGED. *a.* (from *string.*) Having strings; produced by strings (*Milton*).

STRI′NGENT. *a.* (*stringens*, Lat.) Binding; contracting.

STRINGHALT, in farriery, an involuntary and convulsive motion of the muscles of a horse, which extend or bend the hough. When it seizes the outside muscles, the horse straddles, and throws his legs outwards; but when the inside muscles are affected, his legs are twitched up to his belly. Sometimes it is only in one leg; sometimes in both. It generally proceeds from some strain or blow, and the cure is difficult, and seldom attended with success; though, in the beginning, a stringhalt may be removed with good rubbing and the use of fomentations, with daily but moderate exercise. The last refuge is usually the fire, which Gibson says has been known to answer at least so far as to prevent absolute lameness.

STRI′NGLESS. *a.* (from *string.*) Having no strings (*Shakspeare*).

STRI′NGY. *a.* (from *string.*) Fibrous; consisting of small threads; filamentous (*Grew*).

To STRIP. *v. a.* (*streopen*, Dutch.) 1. To make naked; to deprive of covering (*Hayward*). 2. To deprive; to divest (*Duppa*). 3. To rob; to plunder; to pillage (*South*). 4. To peel; to decorticate (*Brown*). 5. To deprive of all (*South*). 6. To take off covering (*Watts*). 7. To cast off: not in use (*Shakspeare*). 8. To separate from something adhesive or connected (*Locke*).

Strip, *s.* (probably from *stripe.*) A narrow shred (*Swift*).

To STRIPE. *v. a.* (*strepen*, Dutch.) 1. To variegate with lines of different colours. 2. To beat; to lash.

Stripe. *s.* (*strepe*, Dutch.) 1. A lineary variation of colour (*Bacon*). 2. A shred of a different colour (*Arbuthnot*). 3. A weal, or discoloration made by a lash or blow (*Thoms.*). 4. A blow; a lash (*Hayward*).

STRI′PLING. *s.* A youth; one in the state of adolescence (*Arbuthnot*).

To STRIVE. *v. n.* preterit *strove*, anciently *strove*d; part. pass. *striven.* (*streven*, Dutch.) 1. To struggle; to labour; to make an effort (*Romans*). 2. To contest; to contend; to struggle in opposition to another (*Tillotson*). 3. To vie; to be comparable to; to emulate; to contend in excellence (*Milton*).

STRI′VER. *s.* (from *strive.*) One who labours; one who contends.

STRIX. Owl. In zoology, a genus of the class aves, order accipitres. Bill hooked; cereless; nostrils oblong, covered with bristly recumbent feathers; head, auricles and eyes large; tongue bifid. Fifty species, scattered over Europe, Asia, and America: about half the number eared, and half earless.

These fly abroad only by night, and prey on small birds, mice and bats; the eyes are weak by day, and generally closed; during which time, if discovered and attempted to be driven away, they make short low flights, as if afraid of dashing against some unforeseen object. The legs are usually downy to the toes; outer toe retractile; auricles large, covered with a membrane; outer quill-feather serrate on each edge; claws hooked, sharp.

When overtaken by a return of day-light, they are so dazzled and confounded that, if far from home, they remain in the same spot till the return of evening: and if the other birds perceive, by his awkwardness or fear, the distress of the owl's situation, they fly with emulation to insult him. The thrush, the jay, the bunting, and the red-breast, attack him in a body, with cries, insults, and strokes of their wings; the unfortunate owl knows not how to defend himself, or where to fly; astonished and dizzy, says Buffon, he only replies to their mockeries by awkward and ridiculous gestures, by rolling his eyes, and turning his head with an air of stupidity. Among this tribe of tormentors, the smallest and most feeble of his enemies are commonly the foremost; and by a mistake similar to what the owl himself has committed, they sometimes prolong their insults till the return of evening restores him the use of his sight. Then he also becomes truly formidable, and inflicts on his tormentors a dreadful revenge for their audacity.

All the different species of owls are not equally distinguished by this extreme sensibility of sight; and consequently not equally overpowered by the light of day. The great owl of North America takes considerable flights, and is sometimes seen chacing its prey successfully at noon-time; while the common barn-owl, far from being able to encounter the full rays of the sun, possesses so keen a sensibility of vision, that it catches mice even in the middle of the night. This difference in the sight regulates the time of their depredations; such as nearest resemble other birds, issue from their retreats immediately after the setting of the sun; the more quick-sighted remain concealed till further in the evening, when they also fall with destructive success on the smaller birds, in the midst of that season of repose.

The owls in general conceal themselves in some dark retreat during the day; the cavern of a rock, the hollow of a tree, or the holes of a ruinous and unfrequented castle, are their solitary abodes, which they often render appalling by their hideous cries. The harshness of their notes, the darkness and silence during which they are heard, joined to the gloomy haunts they inhabit, have always strongly affected the imaginations of men, and given rise to melancholy ideas. The prejudices and weaknesses of the uninformed, alarmed by these frightful images, have always led them to regard the voice of the screech owl as a presage of some sad calamity. It is only, however, when owls are stationary, that they utter these doleful notes; while in pursuit of their prey they are all silent, as the smallest noise might alarm the birds which it is their endeavour to surprise.

We shall select an example or two.

1. S. bubo. Great owl. Body tawny: in other varieties darker with blackish wings, or with the legs naked; or blackish-yellow, variegated with white. Inhabits Europe, Calmuc Tartary, South America: found in our own country. This bird, by some, has been called the eagle owl; and at first sight it appears nearly of that size, from the great quantity of feathers with which it is covered. It differs, however, from the eagle in every proportion, the head being larger, and all the parts of the body less than in the birds of that genus. The breadth of the wings is about five feet; the head unequal to the size of the body; and the cavities of the ears large and deep. On each side of the head rise two tufts of feathers resembling horns, two inches and an half long, which the animal can erect or fold down at pleasure. The beak is black and hooked; the eyes large and transparent, and surrounded with an iris of an orange colour; the neck short, and the whole body covered with a reddish brown plumage, interspersed on the back with yellow and black spots. This bird has a frightful cry, with which he interrupts the silence of the night. He inhabits rocks and old towers, the most retired he can find: chaces hares, rabbits, moles, and mice, which he swallows entire; but the hair, bones, and skin, which resist the action of the stomach, he vomits up in round balls. There is no bird more successful in taking its prey, or whose young are so abundantly supplied with food. He often wages war with the kite, and deprives him of his booty. As he bears the light better than the other nocturnal birds, he defends himself with great bravery against the crows, which sometimes pursue and attack him by day.

2. S. otus, Long-eared owl. Feathers of the ears six. This species is found also in Britain, and is much less than the former, being only three feet and an half in breadth, with the wings expanded: its horns are much shorter, and rise above the head only an inch, more resembling the ears than the horns of quadrupeds. They consist of six feathers variegated with yellow and black. The breast and belly are of a dull yellow, marked with slender brown streaks pointing downwards. Varieties of this kind of owl are to be found all over Europe, and in many places of America. Those of Carolina, described by Catesby, and those of South America by Feuillée, differ only in the shades and distribution of their colours; a circumstance which may arise from the climate. These birds are seldom at the trouble of building a nest; their eggs and their young have always been found in the nests of pies or kites, deserted by their original owners. Their young are generally four or five in number; and white, when protruded from the shell.

This species is much more common and numerous than the preceding, which is rarely to be found with us in winter; while the long-eared owl is found through every season of the year. Its ordinary habitation is in the walls of old buildings, in the cavities of rocks, in the hollow of decayed trees, chiefly in remote situations. It but rarely descends from these retreats into the plain. When attacked by other birds, it makes a vigorous defence with its claws and beak; and when assailed by an enemy too powerful, it turns upon its back to have the more ready use of these means of protection.

3. S. scops. Little-horned owl. Ears, of one feather each; hardly conspicuous in the dead body. This bird is easily distinguishable from the two former, by its small size, being only seven inches long; and by the ears, which only rise about half an inch from the head,

and are composed of a single feather. The head is much smaller in proportion to the body than those of the preceding; and the feathers are more beautifully variegated with brown, black, and red. The far greater part of this species emigrate during winter. They assemble in flocks, about the end of summer, and take their departure nearly at the same time. They pursue the field mice in multitudes together, and in France and England are of great service in destroying these pernicious vermin.

Catesby describes a bird found in Carolina, which seems to belong to this species; it is about a third larger in size, and the wings do not reach the extremity of the tail; in the other, they fall beyond it.

This bird being migratory, is supposed by Buffon to pass from the old to the new continent. He pretends, that in New Spain there is a species of owl found, either the same, or so similar as to constitute only a variety. Of this, however, there is no certainty; for the natural history of this bird is far from being well ascertained. It is but seldom seen, and much seldomer taken in this country; its manners and migrations may be placed among the desiderata of ornithology.

4. S. ulula. Brown owl. Body above brown, variegated with white and black spots; below, blackish bars across and longitudinally; wing-coverts streaked with transverse bars of deep brown. Its wings extend beyond the extremity of the tail; and its breadth, when flying, is three feet three inches. This species devours small birds, which it swallows entire. It returns in the morning, after the chace is over, and conceals itself in the thickest coppices, or, if the weather be severe, in the hollow of a tree. There is a variety much smaller.

5. S. stridula. Tawny owl. Back, head, and coverts of the wings are of a fine tawny red, elegantly spotted, and powdered with black or dusky spots of various sizes: the breast and belly are yellowish, mixed with white, and marked with narrow black streaks pointing downwards: the third quill-feather longer than the rest. It is described by Linnæus in his Fauna, as an inhabitant of Sweden; it is also found in America and the West Indies, with such small varieties as the climate may be expected to produce: we likewise meet with it in our own climate.

6. S. flammea. Common or barn owl. Body above pale yellow with white dots, beneath whitish with blackish dots. This is almost a domestic bird, inhabiting barns, haylofts, churches, and even villages. It utters continually a disagreeable kind of hissing, or harsh and mournful cries, which the uninformed in the country believe to be ominous; and when it perches upon a house, and utters its doleful notes, it is often regarded as the messenger of death.

The elegant plumage of this bird, however, makes some compensation for its disagreeable voice. A circle of soft white feathers surrounds its eyes; the upper part of the body and coverts of the wings are of a fine pale yellow; the lower part is wholly white. When taken old, it refuses all food, and dies in ten or twelve days of hunger. It is found in Europe and America. It is more indolent than most of its tribe, and carelessly deposits its eggs in the holes of walls, and of trees, without any preparation of withered grass, roots, or leaves for their reception. Its period of ovation commences in March, when it lays five or six eggs of an oblong shape, and of a whitish colour. The young, after their first appearance, are wholly white, and are fed chiefly with insects, and morsels of the flesh of mice. When about the age of three weeks, they are reckoned by the French good eating. They are then fat and plump, but the nature of their food does not seem calculated to improve their relish; for they frequently drink the oil out of lamps.

7. S. passerina. Little owl. Quill-feathers with five rows of white spots. Another variety smaller; eyes surrounded with white circles: a third, larger, twelve inches long, chin white; wings variegated brown and yellow. This is one of the smallest of the race of owls, measuring only (except the last variety) from seven to eight inches, and nearly of the size of a thrush. It is distinguished from the small-horned owl, by having no prominent feathers at the ears like that bird; and by the regularity of its white spots upon the wings and body. It frequents, like other owls, old buildings and quarries; but differs from them considerably in the nature of its sight; and is not, strictly speaking, a nocturnal bird, for it is far more capable of enduring the rays of light than the rest of this gloomy and lugubrious tribe. It frequently exercises itself in an unproductive chace of the swallow; but is more successful among the mice, which it tears in pieces, because unable to swallow them entire. It uses also a precaution peculiar to itself, and clears away the hairs from its morsels, which the others devour, and afterwards vomit in the form of round balls.

8. 9. The foreign birds belonging to the tribe of owls are numerous, and of various sizes. That called cambura by the natives of Brasil has been described by Marcgraave, and seems to resemble the small horned owl, by having two tufts of feathers over the ears; its plumage is yellow, and its size nearly that of a thrush. Another foreigner of this tribe is found at Hudson's bay, and has been engraved and coloured by Edwards, under the title of the little hawk owl. The eyes and bill are orange; the plumage brown and white; the form of the wings and tail approximates to that of the hawk; but the size of the head demonstrates the affinity of this species to the family of owls.

10. There is in the northern latitudes a bird common both to the new and old world, described by Linnéus, by the Swedish name, harfang: the S. nyctea of most ornithologists. In size, it is equal to the largest of the owl kinds, being two feet long: and like most other birds in high latitudes, its plumage is of a beautiful white. Its head is variegated with small

brown spots, and its back with some lines of the same colour, in America; but upon the mountains of Lapland, it is pure white. This snowy owl flies abroad by day, and preys on herons, hares, mice, and sometimes carrion; making a howling noise.

11. S. cunicularia. Coquimbo owl. Body above, brown; beneath white; legs warty, hairy. Amidst the varieties of foreign birds of this genus, this is mentioned by P. Fouillée, as inhabiting the province of Chili, and which, he asserts, digs holes in the ground for bringing forth its young, and for its own habitation, which it makes in long subterraneous burrows. Size of a pigeon; flies in pairs, and feeds on insects and reptiles.

STROBILE. Strobilus. In botany, pericarpium ex amento factum; squamis induratis, is added in Term. Bot. 618. A pericarp formed from an ament, by the hardening of the scales. In Regn. Veg. it is thus expressed: Strobilus imbricatus amenti coarctati. That is, a strobile is made up of scales that are imbricate, or lie over each other, from an ament contracted or squeezed together, in this state of maturity. This term includes not only the cone of former writers, but also some other fruits which recede considerably in structure from that sort of pericarp; as that of magnolia. To translate strobilus therefore by cone is improper, as creating confusion.

STROEMIA, in botany, a genus of the class pentandria, order monogynia. Corol with four or no petals; calyx four-leaved; nectary ligulate; berry barky, pedicelled. Four species; natives of India or Arabia; with terminal racemes, and generally nodding flowers.

STRO'KAL. *s.* An instrument used by glass-makers (*Bailey*).

STROKE or STROOK. The old preterit of *strike*, now commonly *struck*.

STROKE. *s.* (from *strook*, the pret. of *strike*.) 1. A blow; a knock; a sudden act of one body upon another (*Shakspeare*). 2. A hostile blow (*Swift*). 3. A sudden disease or affliction (*Harte*). 4. The sound of a clock (*Shaksp.*). 5. The touch of a pencil (*Pope*). 6. A touch; a masterly or eminent effort (*Baker*). 7. An effect suddenly or unexpectedly produced. 8. Power; efficacy (*Dryden*).

To STROKE. *v. a.* (ꞅꞇꞃacan, Saxon.) 1. To rub gently with the hand by way of kindness or endearment; to soothe (*Bacon*). 2. To rub gently in one direction (*Gay*).

To STROLL. *v. n.* To wander; to ramble; to rove; to gad idly (*Swift*).

STRO'LLER. *s.* (from *stroll.*) A vagrant; a wanderer; a vagabond (*Swift*).

STROMA, a small island of Scotland, on the coast of Caithnessshire, in Pentland Frith. Its caverns were once used as places of interment, by the inhabitants of the neighbouring islands. Near its N. end is a dangerous whirlpool.

STROMBERG, a town of Westphalia, in the principality of Munster, 20 miles E.S.E. of Munster, and 20 N.W. of Paderborn.

STROMBERG, a town of France, in the department of Rhine and Moselle, lately of Germany, in the palatinate of the Rhine, 22 miles W. of Mentz, and 32 S. of Coblentz.

STROMBOLI, the most northern of the Lipari islands. It is a volcano, which rises in a conical form to the height of 3000 feet; and on the E. side are three or four little craters ranged near each other, nearly at two thirds of its height. It is inhabited, notwithstanding its fires, and produces a great deal of cotton. Of all the volcanoes recorded in history, Stromboli seems to be the only one that burns without ceasing; and for ages past, it has been looked upon as the great lighthouse of the Mediterranean sea. Lon. 15. 40 E. Lat. 38. 40 N.

STROMBUS, in zoology, a genus of the class vermes, order testacea. Animal a limax; shell univalve, spiral; aperture much dilated; the lip expanding, and produced into a groove leaning to the left. Fifty-three species, thus subdivided.

A. Lip projecting into linear divisions or claws.
B. Lobed.
C. Dilated.
D. Tapering with a very long spire.

All these shells in their younger state want the lip, and have a thin turbinate appearance; whence many of them have been mistaken by authors, and referred to a wrong genus. We shall select a specimen or two.

1. Pes pelecani. Corvorants foot. Lip with four palmate angular claws; mouth smooth; shell pointed, whitish, cinereous, or reddish, within white, smoothed, polished; whorls tuberculate. Inhabits European and American seas, and the only species of this genus found on our own coasts: two inches long.

2. S. chiragra. Lip with six curved claws, and recurved beak: shell large, brown varied with white, the back tuberculate; lips striate, two hindmost claws divergent and bent outwards. Inhabits the Indian ocean; very rare and valuable.

3. S. gallus. Lip mucronate on the fore part and very long; back crowned with tubercles; beak straight; shell sometimes uniformly brown, yellow, or violet, sometimes varied with spots and rays; the back surrounded with smooth ribs, which are sometimes simple, sometimes double; the first whorl crowned with tubercles, which in the other whorls are more or less conspicuous.

STROMOE, the principal of the Feroe islands, in the Northern ocean, 30 miles in length and 10 in breadth. It has a town called Thorshaven, which is the capital of all the islands, and the common market. Lon. 7. 0 W. Lat. 62. 10 N.

STROMSTADT, a town of Sweden, in W. Gothland, celebrated for its shellfish. It stands on the coast of the North sea, 43 miles N.N.W. of Uddevalla. Lon. 11. 4 E. Lat. 59. 43 N.

STROND. *s.* (from *strand.*) The beach; the bank of the water: obsolete (*Shakspeare.*)

STRONG. *a.* (ꞅꞇꞃanꝫ, Saxon.) 1. Vigorous; forceful; of great ability of body (*Psa.*). 2. Fortified; secure from attack (*Locke*). 3.

Powerful; mighty (*South*). 4. Supplied with forces (*Bacon*). 5. Violent; forcible; impetuous (*Prior*). 6. Hale; healthy (*Ecclesiasticus*). 7. Forcibly acting on the imagination (*Bacon*). 8. Ardent; eager; positive; zealous (*Addison*). 9. Full; having any quality in a great degree; affecting the sight forcibly (*Newton*). 10. Potent; intoxicating (*Swift*). 11. Having a deep tincture; affecting the taste forcibly (*King Charles*). 12. Affecting the smell powerfully (*Hudib.*). 13. Hard of digestion; not easily nutrimental (*Hebrews*). 14. Furnished with abilities for any thing (*Dryden*). 15. Valid; confirmed (*Wisdom*). 16. Violent; vehement (*Corbet*). 17. Cogent; conclusive (*Shakspeare*). 18. Able; skilful; of great force of mind (*Shakspeare*). 19. Firm; compact; not soon broken (*Pope*). 20. Forcibly written; comprising much meaning in few words (*Smith*).

STRONGFI'STED. *a.* (*strong* and *fist.*) Strong-handed (*Arbuthnot*).

STRO'NGHAND. *s.* (*strong* and *hand.*) Force; violence (*Raleigh*).

STRO'NGLY. *ad.* (from *strong*). 1. Powerfully; forcibly (*Bacon*). 2. With strength; with firmness; in such a manner as to last (*Shakspeare*). 3. Vehemently; forcibly; eagerly (*Swift.*)

STRO'NGWATER. *s.* (*strong* and *water.*) Distilled spirits (*Bacon*).

STRONGYLUS, in zoology, a genus of the class vermes, order intestina. Body round, long, pellucid, glabrous; the fore-part globular, truncate, with a circular aperture fringed at the margin: the hind-part of the female entire and pointed, of the male dilated into loose, distant, pellucid membranes. Two species, as follow.

1. S. equinus. Head opake; intestine black. Male, pale yellow, with a fine yellowish membrane covering the intestines; tail three-leaved, with a small spine or two: female, with white filiform vesicles surrounding the intestines. Inhabits the intestines of the horse in great numbers.

2. S. ovinus. Found in the intestines of sheep.

STRONSA, one of the Orkney islands, situate N.E. of that called Pomona. It is seven miles from N. to S. and nearly the same in breadth, but so indented by bays, that no part of it is above a mile and a half from the sea. It produces much kelp, and feeds many sheep and cattle.

STRONTIA. Strontian. In mineralogy, a genus of the class earths, order ponderous. Consisting of strontian earth combined with acids; separates from a saturated solution in nitric acid, in the form of rhomboidal chrystals; totally soluble in nitric and muriatic acids with effervescence: does not melt in a strong heat, but discovers a bright phosphorescent light. Two species.

1. S. carbonata. Strontianite. Carbonat of strontia or strontian. Combined with carbonic acid. Found in the lead mine of Strontian in Argyleshire, in granite rocks, accompanied by galena and witherite, generally in amorphous masses or in a state of crystallization; colour whitish-green; has some lustre and a little transparency; when exposed to heat does not crackle or split, but before the blow-pipe becomes white and opake; with borax it effervesces and melts into a colourless, transparent glass: soluble in 200 parts of water, at a temperature of 60°, the solution tinging flame red; its crystals are confusedly grouped, and more or less diverging from a centre, and are usually six-sided prisms, terminated by three-sided pyramids: specific gravity from 3.400 to 3.644; contains, according to Pelletier,

Strontian . .	62
Carbonic acid	30
Water . . .	8
	100

2. S. sulphata. Celestine. Sulphat of strontian. Combined with sulphuric acid. Three varieties.

α. Earthy sulphat of strontian. Opake, brittle, compact, somewhat splintery, in round pieces. Found at Montmarte, near Paris, of a blueish-grey colour, without lustre; specific gravity 3.5: contains, according to Vauquelin,

Sulphat of strontian	91.42
Carbonat of lime .	8.33
Oxyd of iron . .	9.25
	109.00

β. Fibrous sulphat of strontian. Fibrous, with the fibres straight, somewhat transparent. Found in many parts of Britain, and other European countries, in masses; colour pale blue, reddish or white; externally it has little or no lustre, internally shining: specific gravity 3.83.

γ. Foliated sulphat of strontian. Fibrous, with the fibres diverging; texture of the crystals straight, foliated. Found in Britain and Sicily in masses and crystals, the amorphous pieces fibrous and still diverging; the crystals grouped, shining, semitransparent; colour white.

Strontian was first discovered about the year 1787, by a dealer in fossils, and was for some time regarded as a carbonat of barytes: but Dr. Crawford having observed some difference between its solution in muriatic acid and that of barytes, published, in 1790, that it probably contained a new earth, and sent a specimen to Mr. Kirwan, that he might examine its properties, who gave his valuable dissertation on it to the Irish Academy in 1794, though it was not printed in that work till 1795. It was Klaproth, however, who first gave it the name of strontian, from that of the place where it was first found.

Strontian is traced abundantly in different places of the world, and always combined with carbonic acid or sulphuric acid.

1. The carbonic acid may be expelled from the carbonat, and the strontian obtained pure, by mixing the mineral with charcoal powder, and exposing it to a heat of 140° Wedgewood; or by dissolving the mineral in nitric acid,

evaporating the solution till it crystallizes, and exposing the crystals in a crucible to a red heat till the nitric acid is driven off.

2. Strontian thus obtained is in porous masses, of a greyish white colour; its taste is acrid and alkaline; and it converts vegetable blues to green. Its specific gravity, according to Hassenfratz, is 1.647. It does not act so strongly on animal bodies as barytes, nor is it poisonous.

It does not melt when heated like barytes; but before the blow-pipe it is penetrated with light, and surrounded with a flame so white and brilliant that the eye can scarcely behold it.

3. When water is sprinkled on strontian it is slacked, becomes hot, and falls to powder exactly like barytes; but it is not so soluble in water as that earth. One hundred and sixty-two parts of water, at the temperature of 60°, dissolve nearly one part of strontian. The solution, known by the name of strontian water, is clear and transparent, and converts vegetable blues to a green. Hot water dissolves it in much larger quantities; and as it cools, the strontian is deposited in colourless transparent crystals. These are in the form of thin quadrangular plates, generally parallelograms, the largest of which seldom exceeds one-fourth of an inch in length. Sometimes their edges are plain, but they oftener consist of two facets, meeting together, and forming an angle like the roof of a house. These crystals generally adhere to each other in such a manner as to form a thin plate of an inch or more in length, and half an inch in breadth. Sometimes they assume a cubic form. They contain about 68 parts in 100 of water. They are soluble in 51.4 parts of water, at the temperature of 60°. Boiling water dissolves nearly half its weight of them. When exposed to the air, they lose their water, attract carbonic acid, and fall into powder. Their specific gravity is 1.46.

4. Strontian is not acted on by light; neither does it combine with oxygen.

5. Sulphur and phosphorus are the only simple combustibles with which it unites.

The sulphuret of strontian may be made by fusing the two ingredients in a crucible. It is soluble in water by means of sulphureted hydrogen, which is evolved. When the solution is evaporated, hydrosulphuret of strontian is obtained in crystals, and hydrogenated sulphuret remains in solution. These compounds resemble almost exactly the sulphuret, hydrosulphuret, and hydrogenated sulphuret of barytes; and do not therefore require a particular description. The same remark applies to the phosphoret of strontian, which may be prepared by the same process as the phosphoret of barytes.

6. Strontian does not combine with azote; but it unites readily with muriatic acid, and forms the substance called muriat of strontian.

7. Strontian has no action upon metals; but it combines with several of their oxyds, and forms compounds which have not hitherto been examined.

8. It does not combine with alkalies nor with barytes. No precipitation takes place when barytes and strontian water are mixed together.

9. Strontian has the property of tinging flame of a beautiful red, or rather purple colour; a property discovered by Dr. Ash in 1787. The experiment may be made by putting a little of the salt composed of nitric acid and strontian into the wick of a lighted candle; or by setting fire to alcohol, holding muriat of strontian in solution. In both cases the flame is of a lively purple. In this respect it differs from barytes, which when tried in the same way is found to communicate a blueish yellow tinge to flame.

10. The affinities of strontian, as ascertained by Dr. Hope and Mr. Vauquelin, are as follows:

Sulphuric acid,
Phosphoric,
Oxalic,
Tartaric,
Fluoric,
Nitric,
Muriatic,
Succinic,
Acetic,
Arsenic,
Boracic,
Carbonic.

Barytes and strontian resemble each other in their properties as closely as potass and soda: hence, like these two alkalies, they were for some time confounded. It is in their combination with acids that the most striking differences between these two earths are to be observed.

STRONTIAN, a village of Scotland, in Argyleshire, and the district of Ardnamurchan. It is noted for its lead mines, in which a new kind of mineral was discovered in 1787. See the preceding article.

STRONTIANITE, in mineralogy, a stone, which, like strontian, has hitherto only been found at Strontian in Argyleshire, whence M. Werner has given it the name above. Its colour is a clear asparagus-green, passing to greenish or yellowish-white, or apple-green. It is met with in mass, the rifts or cavities of which are often lined with bundles of circular crystals, the form of which approaches to the four or six-sided prism. Its longitudinal fracture is narrow, straight, and divergingly radiated with a shining pearly lustre; the cross-fracture fine-grained, uneven, passing to splintery, its lustre only glimmering. Its fragments are wedge-shaped, or indeterminate. Found in thin, scapiform, wedge-shaped, distinct concretions. It is more or less translucent, sometimes in thin pieces, semi-transparent; it is moderately hard, brittle, and easily frangible. Sp. gr. 3.67 Klapr. 3.4—3.64 Kirw.

Before the blow-pipe it becomes white, and calcines but does not melt. When strongly heated in a clay crucible, it runs into a dense, hard, clear, yellowish-green glass, with a loss of 30 per cent. When intensely heated in a charcoal crucible it becomes of a grey colour, and loses 31 per cent of its original weight, but does not melt. In diluted nitric or muriatic acids, it dissolves readily with a copious effervescence.

Though Werner has made a distinct species of this stone, it has a very close approach to the carbonated strontian of the preceding article.

STROOK. The preterit of *strike*, used in poetry for *struck* (*Waller*).

STROPHADES, two islands in the Ionian sea, on the western coasts of the Peloponnesus, named Strophades from *στρεφω*, *vertò*, because Zethes and Calais, the sons of Boreas, returned from thence by order of Jupiter, after they had driven the Harpies there from the tables of Phineus. The fleet of Æneas stopped near the Strophades.

STROPHE. (Greek.) A stanza, or certain number of verses including a perfect sense; succeeded by another, consisting of the same number and measure of verses, and in the same disposition and rythmus, called antistrophe. What the couplet is in songs, and the stanza in epic poetry, the strophe is in odes.

STROPHIUS, a son of Crisus, king of Phocis. He married a sister of Agamemnon, called Anaxibia, by whom he had Pylades, celebrated for his friendship with Orestes. After the murder of Agamemnon by Clytemnestra and Ægisthus, the king of Phocis educated at his own house with the greatest care his nephew, whom Electra had secretly removed from the dagger of his mother, and her adulterer. Orestes was enabled by means of Strophius to revenge the death of his father.

STROPHULUS. A papulous eruption, peculiar to infants, and exhibiting a variety of forms, which are described by Dr. Willan, under the titles of intertinctus, albidus, confertus, volaticus, and candidus.

1. Strophulus intertinctus, usually called the red gum, and by the French, *efflorescence benigne*. The papulæ characterizing this affection rise sensibly above the level of the cuticle, are of a vivid red colour, and commonly distinct from each other. Their number and extent varies much in different cases. They appear most constantly on the cheeks, fore-arm, and back of the hand, but are sometimes diffused over the whole body. The papulæ are, in many places, intermixed with stigmata, and often with red patches of a larger size, which do not, however, occasion any elevation of the cuticle. A child's skin thus variegated somewhat resembles a piece of red printed linen; and hence this eruption was formerly called the red gown, a term which is still retained in several counties of England, and may be found in old dictionaries. Medical writers have changed the original word for one of a similar sound, but not more significant. The strophulus intertinctus has not, in general, any tendency to become pustular, a few small pustules containing a straw-coloured, watery fluid, occasionally appear on the back of the hand, but scarcely merit attention, as the fluid is always re-absorbed in a short time, without breaking the cuticle. The eruption usually terminates in scurf, or exfoliation of the cuticle; its duration, however, is very uncertain, the papulæ and spots sometimes remain for a length of time, without an obvious alteration, sometimes disappear and come out again daily; but, for the most part, one eruption of them succeeds another, at longer intervals, and with more regularity. This complaint occurs chiefly within the two first months of lactation. It is not always accompanied with or preceded by any disorders of the constitution, but appears occasionally in the strongest and most healthy children. Some authors connect it with aphthous ulcerations common in children, supposing the latter to be a part of the same disease diffused along the internal surfaces of the mouth and intestines. The fact however seems to be, that the two affections alternate with each other; for those infants who have the papulous eruption on the skin are less liable to aphthæ; and when the aphthæ take place to a considerable degree, the skin is generally pale and free from eruption. The strophulus intertinctus is, by most writers, said to originate from an acidity, or acrimonious quality of the milk taken into a child's stomach, communicated afterwards to the blood, and stimulating the cutaneous excretories. This opinion might, without difficulty, be proved to have little foundation. The pre-disposition to the complaint may be deduced from the delicate and tender state of the skin, and from the strong determination of blood to the surface, which evidently takes place in infants. The papulous eruption is, in many cases, connected with a weak, irritable state of the alimentary canal, and consequent indigestion. For if it be by any means suddenly repelled from the surface, diarrhea, vomiting, spasmodic affections of the bowels, and often general disturbance of the constitution succeed; but as soon as it re-appears, those internal complaints are wholly suspended. Dr. Armstrong and others have particularly noted this reciprocation, which makes the red gum, at times, a disease of some importance, though in its usual form it is not thought to be in any respect dangerous. On their remarks a necessary caution is founded, not to expose infants to a stream of very cold air, nor to plunge them unseasonably in a cold bath. The most violent and even fatal symptoms have often been the consequence of such imprudent conduct.

2. The strophulus albidus, by some termed the white gum, is merely a variety of strophulus intertinctus, but deserves some notice on account of the different appearance of its papulæ. In place of those described as characterizing the red gum, there is a number of minute, whitish specks, a little elevated, and sometimes, though not constantly, surrounded by a slight redness. These papulæ, when their tops are removed, do not discharge any fluid; it is however probable that they are originally deformed by the deposition of a fluid, which afterwards concretes under the cuticle. They appear chiefly on the face, neck, and breast, and are more permanent than the papulæ of the red gum. In other respects they have the same nature and tendency, and require a similar plan of treatment. Although a distinctive name has been applied to this eruption, when occurring alone, yet it is proper to observe that in a great number of

cases there are red papulæ and spots intermixed with it, which prove its connexion with the strophulus intertinctus.

3. The strophulus confertus. An eruption of numerous papulæ, varying in their size, appears on different parts of the body in infants during dentition, and has thence been denominated the tooth rash: it is sometimes also termed the rank red gum. About the fourth or fifth month after birth, an eruption of this kind usually takes place on the cheeks and sides of the nose, extending sometimes to the forehead and arms, but rarely to the trunk or body. The papulæ on the face are smaller, and set more closely together than in the red gum; their colour is not so vivid, but they are generally more permanent. They terminate at length with slight exfoliations of the cuticle, and often appear again in the same places, a short time afterwards. The papulæ which in this complaint occasionally appear on the back or loins are much larger, and somewhat more distant from each other, than those on the face. They are often surrounded by an extensive circle of inflammation, and a few of them contain a semi-pellucid watery fluid, which is re-absorbed when the inflammation subsides. In the seventh or eighth, the strophulus confertus assumes a somewhat different form: one or two large irregular patches appear on the arms, shoulder, or neck; in which the papulæ are hard, of a considerable size, and set so close together that the whole surface is of a high red colour. Most commonly the fore-arm is the seat of this eruption, the papulæ rising first on the back of the hand, and gradually extending upwards along the arm. Sometimes, however, the eruption commences at the elbow, and proceeds a little upwards and downwards on the outside of the arm. It arrives at its height in about a fortnight, the papulæ then begin to fade, and become flat at the top, afterwards the cuticle exfoliates from the part affected, which remains discoloured, rough, and irregular, for a week or two longer.

An obstinate and very painful modification of this disease takes place, though not often, on the lower extremities. The papulæ spread from the calves of the legs to the thighs, nates, loins, and round the body as high as the navel: being very numerous and close together, they produce a continuous redness over all the parts above mentioned.

The cuticle presently however shrivelled, cracks in various places, and finally separates from the skin in large pieces. During this process a new cuticle is formed, notwithstanding which the complaint recurs in a short time, and goes through the same course as before. In this manner successive eruptions take place, during the course of three or four months, and perhaps do not cease till the child is one year old, or somewhat more. Children necessarily suffer great uneasiness from the heat and irritation occasioned by so extensive an eruption, yet, while they are affected with it, they often remain free from any internal or febrile complaint This appearance should be distinguished from the intertrigo of infants, which exhibits an uniform, red, smooth, shining surface, without papulæ; and which affects only the lower part of the nates and inside of the thighs, being produced by the stimulus of the urine, &c. with which the child's cloaths are almost constantly wetted. The strophulus confertus where the child is otherwise healthy, is generally ascribed to a state of indigestion, or some feverish complaint of the mother or nurse. Dr. Willan however asserts that he has more frequently seen the eruption, when no such cause was evident. It may with more probability be considered as one of the numerous symptoms of irritation, arising from the inflamed and painful state of the gums in dentition; since it always occurs during that process, and disappears soon after the first teeth have cut the gums.

4. The strophulus volaticus is characterized by an appearance of small circular patches, or clusters of papulæ, arising successively on different parts of the body. The number of papulæ in each cluster is from six to twelve. Both the papulæ and their interstices are of a high red colour. These patches continue red with a little heat or itching, for about four days, when they turn brown, and begin to exfoliate. As one patch declines another appears at a small distance from it, and in this manner the complaint often spreads gradually over the face, body, and limbs, not terminating in less than three or four weeks. During that time the child has sometimes a quick pulse, a white tongue, and seems uneasy and fretful. In many cases, however, the eruption takes place without any symptoms of internal disorder. The above complaint has been by some writers denominated ignis volaticus infantum: under this title Astruc and Lorry have described one of the forms of crusta lactea, in which a successive eruption of pustules takes place on the same spot, generally about the mouth or eyes, in children of different ages, and sometimes in adults. The maculæ volaticæ infantum mentioned by Wittichius, Sennertus, and Sebizeus, agree in some respect with the strophulus volaticus; but they are described by other German authors as a species of erysipelas, or as irregular efflorescences affecting the genitals of infants, and often proving fatal. The strophulus volaticus is a complaint by no means frequent. In most cases which have come under Dr. Willan's observation, it appeared between the third and sixth month; in one instance, however, it occurred about ten days after birth, and continued three weeks, being gradually diffused from the cheeks and forehead to the scalp, afterwards to the trunk of the body, and to the extremities, when the patches exfoliated a red surface was left, with slight border of detached cuticle.

5. Strophulus candidus. In this form of strophulus the papulæ are larger than in any of the foregoing species. They have no inflammation round their base; their surface is

very smooth and shining, whence they appear to be of a lighter colour than the adjoining cuticle. They are diffused, at a considerable distance from each other, over the loins, shoulders, and upper part of the arms; in any other situation they are seldom found.

This eruption affects infants about a year old, and most commonly succeeds some of the acute diseases to which they are liable. Dr. Willan has observed it on their recovery from a catarrhal fever, and after inflammations of the bowels or lungs. The papulæ continue hard and elevated for about a week, then gradually subside and disappear.

STROUD, a town in Gloucestershire, with a market on Friday. It is seated on a brook, whose waters being peculiarly adapted to the dying of scarlet, its banks are crowded with the houses of clothiers; and a navigable canal accompanies its progress to the Severn. This canal is now extended to join the Thames at Lechlade. Stroud is 11 miles S. by E. of Gloucester, and 100 W. by N. of London.

STROUD, a considerable village in Kent, which joins the N. end of Rochester bridge, being parted from the city by the river Medway.

STROVE. The preterite of *strive*.

To STROUT. *v. n.* (*strussen*, German.) To swell with an appearance of greatness; to walk with affected dignity: now *strut*.

To STROUT. *v. a.* To swell out; to puff out; to enlarge by affectation (*Bacon*).

To STROW. *v. n.* (See *To* STREW.) 1. To spread by being scattered (*Milton*). 2. To spread by scattering; to besprinkle (*Dryden*). 3. To spread (*Swift*). 4. To scatter; to throw at random (*Waller*).

To STROWL. *v. n.* To range; to wander (*Gay*).

To STROY. *v. a.* (for *destroy*.) (*Tusser*).

STRUCK. The old preterit and participle passive of *strike*.

STRU'CKEN. The old part. pass. of *strike*.

STRU'CTURE. *s.* (*structure*, Fr. *structura*, Latin.) 1. Act of building; practice of building (*Dryden*). 2. Manner of building; form; make (*Woodward*). 3. Edifice; building (*Pope*).

To STRU'GGLE. *v. n.* 1. To labour; to act with effort. 2. To strive; to contend; to contest (*South*). 3. To labour in difficulties; to be in agonies or distress (*Dryden*).

STRU'GGLE. *s.* (from the verb.) 1. Labour; effort. 2. Contest; contention (*Atterbury*). 3. Agony; tumultuous distress.

STRUMA. (from *struo*, to heap up.) This term is applied by some authors to scrofula, and by others to an induration of the thyroid gland, which is endemial to the Tyrolese and Swiss.

STRUMARIA, in botany, a genus of the class hexandria, order monogynia. Corol superior, six-petalled, spreading; style thickened beneath the middle, or cohering with the filaments; stigma three-cleft; capsule roundish, three-celled. Six species, all Cape plants, some with reddish, others with violet spathes, and white flowers.

STRU'MOUS. *a.* (from *struma*.) Having swellings in the glands (*Wiseman*).

STRU'MPET. *s.* A whore; a prostitute.

To STRU'MPET. *v. a.* To make a whore; to debauch (*Shakspeare*).

STRUMPFIA, in botany, a genus of the class pentandria, order monogynia. Calyx five-toothed, superior; corol five-petalled; anthers cohering; berry one-seeded. One species only, strumpha maritima, a maritime plant of Curacao.

STRUNG. The pret. and part. pass. of *string*.

To STRUT. *v. n.* (*strussen*, German.) 1. To walk with affected dignity; to swell with stateliness (*Ben Jonson*). 2. To swell; to protuberate (*Dryden*).

STRUT. *s.* (from the verb.) An affectation of stateliness in the walk (*Swift*).

STRUTHIO. Ostrich. Cassowary. Bill subconic; nostrils oval; wings short, unfit for flight; feet formed for running. Four species, as follow.

1. S. camelus. Feet two-toed.

Though the power of flying may be considered as the distinguishing attribute of the feathered tribes in general, yet there are some particular families to which nature has denied that endowment; while she has granted it to a few of the quadrupeds, and even of fishes. It is thus that she displays the extent of her power, by the variety of her productions, and disdains to be confined within the narrow limits prescribed to her by the systems of philosophers. As we descend from the class of quadrupeds to contemplate that of birds, we find the connecting links, which unite these two orders into one great chain, very short, and almost imperceptible; for, while the flying squirrel, the bat, and some of the inferior quadrupeds, are invested with the power of flight and with other properties of birds, the ostrich, dodo, and cassowary, are, by their enormous size, confined to the ground, and indicate, by their habits, a near affinity to the four-footed animals. Thus, as we descend from those swift and slender birds, which are destined to move in the higher regions of the air, we find them growing, by gradual and almost imperceptible degrees, heavier and less agile; till, at length, being wholly destitute of the qualities necessary for flight, they are incapable of rising from the surface of the earth.

The ostrich is the largest of all birds, and, from this prerogative in a great measure, is incapable of flight, the great prerogative of the order. Its weight is about fourscore pounds; its height, from the top of the head to the ground, is from seven to nine feet; length, from the beak to the top of the tail, is about the same. When walking, it seems as tall as a man on horseback. The plumage of the ostrich, however, as well as its weight, is an insuperable bar against its ever rising into the air. The vanes of the wing-feathers are separate and detached, like hairs, and incapable of making any impression on the atmosphere. Those of the tail, and, indeed, of the whole body, are of the same structure. They are all as soft as down, and utterly unfit, not only for flying, but for defending the body of the animal from external injury. The feathers of other birds have their webs broader on the one side than on the other; but those of the ostrich have the shaft exactly in the middle. The head, upper part of the neck, sides and thighs, are covered, instead of with feathers, with a clear and white kind of hair, which, on the head, somewhat resembles the bristles of a hog. The thighs of this bird, in which its strength seems chiefly to reside, are large and muscular; and its hard and scaly legs, which are supported by two thick toes, have a striking similarity to those of a goat. These toes are of unequal size; the inner, which is both longer and thicker, being seven inches in length, including the claw. The other, which is without a claw, is only four inches. It is the only bird that possesses eyelids, and these are fringed.

The internal structure of the ostrich exhibits still more decisive proofs of its affinity to the race of quadrupeds, and of its deviation from that of birds. The heart and lungs are separated by a midriff, as in quadrupeds; while the sexual organs bear an equal resemblance and analogy; as do also the kidneys, which differ from those of other birds, in not being divided into two lobes. It has two stomachs, the one larger, resembling the crop of other birds; and the other smaller, and constructed like the stomach in the human species. The first is furnished with a large number of muscular fibres, and seems to act by trituration; while the second, which acts by means of a gastric liquor, is, on opening the bird, constantly found filled with a variety of different substances, vegetables, grain, flesh, and even with stones, glass, or iron. It lays from forty to fifty eggs as large as the head of a child.

Though the ostrich be a bird known from the earliest ages, it is probable that we are unacquainted with many interesting particulars relating to its history. The authors of the sacred volume have many comparisons drawn from its manners; and, as an article of food, we know it was forbidden to the Jews. Aristotle also mentions this bird, as no less remarkable for its size than fecundity. In those parched deserts of Africa, however, where it resides, and where it runs with such precipitation on the approach of any invader, it can seldom become an object of close examination, particularly to men of such curiosity as might induce them to describe its manners. The race of these birds, though ancient, still remains pure, and almost solitary. Like the elephant among quadrupeds, the ostrich constitutes a genus offering few or no varieties, and perfectly distinguished by characters equally striking and permanent.

The ostrich is peculiar to Africa, to the neighbouring islands, and to those parts of Asia that lie in the vicinity of the African continent. The native country of the rhinoceros and the elephant, of the latter of which the ostrich is the representative among birds, is also the birth-place of this singular creature. It is seldom found beyond the distance of thirty-five degrees from the line, on either side; and, as it is incapable of flight, it must, like the quadrupeds of these latitudes, have always been confined to the ancient continent. It prefers, for its residence, those mountains, and parched deserts, that are never refreshed by rain; a circumstance which tends to corroborate the report of the Arabs, that these birds never drink. Vast flocks of them are seen in these barren and solitary regions. At a distance they appear like an army of cavalry, and often alarm the caravans that are travelling through them.

The spoils of the ostrich are too valuable a prize to the huntsmen to admit of his remaining undisturbed, even in those wild retreats. Among some nations, their eggs, their blood, their fat, and their flesh, have been eagerly sought, as articles of food. Whole nations have obtained the appellation of struthophagi, from their partiality for this food; and even the luxurious Romans themselves, as we learn from Apicius, considered the flesh of the ostrich as a delicacy. The emperor Heliogabalus, so justly famed for his extravagance and tasteless profusion, caused, on one day, the brains of six hundred of them to be served up at one meal. At the present day, the inhabitants of Numidia are said to tame them, in order to live upon their flesh, and sell their feathers. Their eggs are about thirty times heavier than those of our common hens, and furnish a plentiful repast for eighteen men. Buffon, however, thinks those writers guilty of exaggeration who have stated their weight at fifteen pounds.

The beauty of the plumage of the ostrich, particularly of the long feathers that compose his wings and tail, is the chief reason why man has been so active in pursuing him into deserts, at so much expense and labour. The Arabs, who make a trade of killing these birds, formerly converted their skins into a kind of cuirass and buckler. The ancients used their plumes as ornaments for their helmets. The ladies in the east make them still an ornament in their dress; and not long since the fine gentlemen of our own country made use of them in decorating their hats. In Turkey, the janissary, who has signalized himself by some military achievement, is allowed to assume them as a decoration to his turban; and the sultan, in the seraglio, when meditating conquests, and feats of a gentle nature, puts them on, as the most irresistible ornament of his person.

The spoils of the ostrich being thus a valuable article of commerce, the hunting of that bird is one of the most serious employments of the Arabs, who train their fleetest horses for the purpose. Although the ostrich be far swifter than the best courser, yet, by hunters on horseback, he is commonly taken; and, of all the varieties of the chace, this is perhaps the most laborious. The Arab, when mounted, still keeps the ostrich in view, without pushing him so close as to make him escape to the distant mountains; but, at the same time, so as to prevent him from taking any food. This is the more easily done, as the foolish bird takes his course in a waving and circuitous direction, which is greatly shortened by the hunters, who come up behind, and, relieving each other by turns, thus keep him still running. After two or three days of fatigue and famine, he becomes so exhausted, that the hunters fall upon him, and, in a few moments, dispatch him, by striking him on the head with cudgels, that his blood may not tarnish the lustre of his white feathers. It is said, that, when he finds all possibility of escape cut off, the ostrich hides his head, in the vain expectation that the whole of his body will then be concealed from his pursuers. There are still other methods of hunting the ostrich, as with dogs and nets; but that practised by the Struthophagi appears most ingenious. They covered themselves with ostrich-skins; and, passing their arms through the necks of them, counterfeited all the motions of these birds. When admitted into their society, they readily surprised them.

The ostriches, though inhabitants of the desert, and possessed of prodigious strength, are, especially if taken when young, neither so fierce nor difficult to tame as might be expected. The inhabitants of Dara and Lybia are said to render them almost domestic, like herds of cattle, with scarcely any other means than constantly accustoming them to the sight of man; to receive from him their food; and to be treated with gentleness.

Besides the use of their feathers, ostriches, in their domestic state, are said to be mounted, and rode upon in the same manner as horses. Firmius, an Egyptian prince of the third century, used them for that purpose; and, in later times, Moore assures us, that, at Ivar in Africa, he saw a man travelling upon an ostrich. Adanson asserts, that, at the factory of Podore, he had himself two ostriches, that, although young, run faster than a race-horse, with two negroes on their backs. But, although these birds may be so tamed, that, like cattle, they will suffer themselves to be driven in flocks to and from their stalls, and even to be mounted like horses; yet there is reason to apprehend, from their invincible stupidity, that they can never be taught to obey the hand of the rider, to comprehend the meaning of his commands, or to submit to his will. For it appears, by Adanson's narrative, that the ostriches at Podore, though they did not run to a great distance, scampered several times around the village; and that they could only be stopped by barricading the passage. From this intractable disposition, there is reason to apprehend, that man will never be able to avail himself of the strength and swiftness of the ostrich, as he has availed himself of those qualities in the horse.

The voracity of this bird far exceeds that of any animal whatever; for it will devour, and that with equal greediness, every thing that it meets with; stones, wood, brass, iron, or leather, as readily as it will grain and fruit, which, in its native wilds, are probably its principal food. Those dissected by Warren and Ramby had their stomachs so crammed with these hetereogeneous substances, that they were astonished that these animals were able to digest such a mass. The fact is, notwithstanding the marvellous accounts of this bird's digestive powers, that iron and other hard substances pass through it without undergoing a greater change by the action of its stomach than they are known from experience to undergo in passing through the stomach and intestines of the common hen or turkey. Whether by trituration, or by the gastric juice, it is not, perhaps, yet fully ascertained; but it is a well established fact, that all metals lose somewhat of their weight when exposed to the action of the stomach of birds.

The cause of the insatiable voracity of the ostrich is the largeness of its stomachs, and the necessity it is under of filling them: its swallowing indiscriminately whatever comes in its way arises from its want of taste and smell. The tongue and mouth are covered with a soft cartilaginous substance, which renders them insensible to the particles of any body that is applied to them. So obtuse and dull is its sense of smell, that this bird will devour what is perfectly poisonous. Vallisnieri saw one that had died from having swallowed a large quantity of quicklime.

This bird is highly salacious, but observes a strict connubial fidelity to his female; a circumstance which is contrary to the usage of most of the heavy birds. The season at which ostriches lay varies with the temperature of the climate. Those on the north side of the line begin about the first of July; while such as inhabit the south of Africa defer it till the latter end of December. Climate and situation have also a great influence on their manner of incubation. In the torrid zone the ostrich is contented with depositing her eggs in a mass of sand, carelessly scraped together with her feet. There they are sufficiently heated by the warmth of the sun, and need the incubation of the female only for a little during the night. But although the ostrich be but little engaged in hatching her eggs, she displays, by continually watching for the preservation of her nascent progeny, all the solicitude of a tender mother: and there is a cruel method of catching them, founded upon this parental affection, which consists in planting around the nest a number of sharp pales, upon which the female stabs herself in her haste to return to her eggs. In proportion to the coldness of the climate, the ostrich hatches with more assiduity; and it is only in the warm regions, where there is no danger of her eggs being chilled, that she leaves them by day; a circumstance from which she very early incurred the reproach of being destitute of affection. So far, however, is this from being true, that she continually watches for their preservation, so long as they remain in a helpless state, which is longer or shorter according to the climate. Neither the size of the eggs of these birds, nor the time necessary for hatching them, nor the number of their young, are exactly ascertained. Some accounts say, that they produce twice or thrice in the year, each brood containing ten or twelve young. Willoughby assigns them no less than fifty eggs in a year; a number, which, at the weight of fifteen pounds each, would make the bird produce seven hundred and fifty pounds weight of eggs; too much, surely, for an animal weighing only eighty pounds.

2. S. rhea. Rhea, or American ostrich. Feet three-toed, and a round callus behind. This bird is so nearly allied to the ostrich, that it may be considered as his representative in the New Continent, to which it peculiarly belongs. It inhabits Guiana, Brasil, Chili, and those immense forests that extend northward from the mouth of the river Plata; and is found as far south as the Magellanic Straits. Formerly these birds were more widely spread over South America; but, in proportion as population increased, these timid animals fled from their habitations, or became victims to superior power.

The rhea, being next in size to the black ostrich, is by far the largest bird in the New World. The adults are six feet high; and Wafer, who measured the thigh of one of the tallest, found it equal to that of a man; while the leg was three feet long. It has the long neck, small head, and flat beak, that distinguish the black ostrich; but, in other respects, it has a greater resemblance to the cassowary. The shape of the body is oval; and, when covered fully with feathers, approaches to rotundity. Its wings are so short as to be useless for flight, but like those of the ostrich, may probably give some assistance in running. The back and rump are covered with long feathers, which hang down over the anus, and form what, in this animal, is the tail. The whole upper part of the body is covered with grey plumage, and the under with white. The toes are three, all before: behind there is a callous kind of heel, which supports the bird, and is supposed to assist it in running. It possesses the same remarkable velocity which characterizes the ostrich; and its running is attended with a singular motion of its wings. It raises one for some time above the body, and then drops it to erect the other, and hold it, for a while, in the same strange position. Such is their velocity, that the savages are obliged to lay snares in order to catch them; for they are in vain chaced by the swiftest dogs.

The rhea shews the same indiscriminate voracity as the ostrich. Like it, it devours stones, iron, and hard substances; and, as this is a quality peculiar to all the granivorous tribes, it is probable that fruit, grain, and vegetable substances are the natural food of this bird. The fables told of the male compelling a number of females to lay in the same nest, and then charging himself with the task of incubation, deserve no credit; nor is the circumstance less romantic of his separating from the nest two eggs, upon which he does not sit, but allows to addle, that, by breaking them in that state, he may collect insects to feed the young. It is probable that the eggs of the rhea, like those of the ostrich, are hatched partly by the heat of the sun, and partly by incubation. The young, says Wafer, when first excluded from the shell, are so familiar, that they follow the first person they meet; but, on growing older, they acquire experience, and become more shy and suspicious. The flesh of the young rhea is reckoned good eating; and it might, perhaps, be improved, and rendered more abundant by domestication, as has been that of the turkey or common hen, which, like the rhea, are indigenous to the burning regions of the torrid zone. The former, in particular, originally inhabited the same tracts of the American continent. This bird defends itself with its feet, and calls its young by a kind of hiss.

3. S. casuarius. Emeu. Cassowary. Feet three-toed; helmets and dew-laps naked. This bird inhabits the torrid zone, and especially the island of Java, whence it was first brought into Europe in 1597. Its habitation begins in those temperate climes, which are contiguous to the precincts of the ostrich; and, as it occupies a region more favourable to the multiplication of the human race, its numbers are continually decreasing in proportion to the increase of the number of its destroyers.

Next to the ostrich and rhea, the cassowaries are the largest birds of the feathered race. They are of various sizes. The one described by the Academy of Sciences in Paris was five feet and an half from the bill to the claws. The Dutch compare the bulk of these birds to that of a sheep. From the shortness of the legs and neck, they are not so tall as the ostrich; but the body has a more heavy and clumsy appearance to the eye. The most remarkable trait in the appearance of these birds is a sort of helmet upon the head, which reaches from the base of the bill to the crown: it is nearly three inches in height, and, at the root, is three in thickness. The middle of the upper eyelid is furnished with a row of black hairs, which gives the animal a kind of wild aspect, that the large aperture of the beak renders still more fierce and menacing. The head and upper part of the neck are almost naked, being only here and there interspersed with blackish hairs, that partially cover a blue wrinkled skin. The feathers that cover the body of the cassowary, as well as those for flight, are all of one kind, and of the same blackish colour. They are generally double, having two shafts that grow from one short trunk, which is fixed in the skin. The small fibres of which the vanes are composed have so little adhesion to each other, that the bird, when viewed at a distance, seems clothed with hair rather than with feathers. The wings of the cassowary are still shorter than those of the ostrich, and, by consequence, still more unfit for flying. They are furnished each with four hard pointed feathers resembling darts, of which the longest, which is eleven inches, is a quarter of an inch thick at the root. Its feet are also armed with large black claws, which give the animal an appearance of being formed for hostility. But, though supplied with weapons that might render it very formidable to the rest of the animal world, the cassowary leads a peaceable and inoffensive life. It never attacks others; and nothing short of necessity will make it even defend itself. When it does defend itself, it kicks like a horse, and pushes down its assailant by running against him, and grunting like a swine.

The movements of the cassowary, when travelling, are awkward, and apparently heavy. It seems to give a kind of kick backward for every hop it makes forward; but, so much is swiftness the prerogative of birds, that the cassowary, which is among the dullest of the tribe, will outrun the fleetest steed. It is distinguished by the same voracity which characterises the rhea and ostrich. It swallows every substance that is offered to it, that is not too large for the circumference of its throat; and possesses the faculty of rejecting its food, when disagreeable, with the same dispatch with which it swallowed it.

The female lays a number of ash-coloured spotted eggs, about thirteen inches in circumference one way, and six the other, of a greenish colour, with still deeper green spots.

4. S. Novæ Hollandiæ. New Holland cassowary. Feet three-toed; crown flat; shanks serrate behind. This species inhabits New Holland, and is nearly as tall as the black ostrich, being not less than seven feet two inches in height. Like the rest of the genus, it runs with prodigious speed, and escapes the pursuit of the greyhound. Bill black; head, neck, and body covered with bristly feathers, varied with brown and grey; throat nakedish, blueish; feathers of the body a little incurved at the tip; wings hardly visible; legs brown. See Nat. Hist. Pl. CLXXXIV.

STRUTHIOLA, in botany, a genus of the class tetrandria, order monogynia. Corol tubular, four-cleft, with eight glands in the mouth; berry juiceless, one-seeded. Five species; shrubs of the Cape.

STRUTHIUM. (ϛρȣθιοι, from ϛρυθος, a sparrow; so named from the resemblance of its flowers to an unfledged sparrow.) The master-wort or soap-wort. See Imperatoria.

STRUTHOPHAGI, a people of Æthiopia, who feed on sparrows, as their name signifies.

STRYCHNOS, in botany, a genus of the class pentandria, order monogynia. Corol five-cleft; berry one-celled, covered with a woody bark. Three species, as follow.

1. S. nux vomica. Leaves ovate, stem unarmed, umbels terminal; flowers small, greenish-white, in axillary and terminal umbels; berry round; seeds covered with downy, radiate hairs. A native of the Indies. The berry is the nux vomica of the shops; for the poisonous and medical properties of which, see Nux vomica, under which specific name it is more generally known.

2. S. potatorum. Leaves ovate, five-nerved, veined, opposite, very entire; cymes axillary; flowers small, fragrant. A native of India.

3. S. colubrina. Leaves lanceolate; tendrils simple. A native of the Indies. The wood of the root is used against the bite of snakes; and its berries are often mistaken for those of nux vomica, and possess similar powers.

STRYMON, a river which separates Thrace from Macedonia, and falls into a part of the Ægean sea, called Strymonicus sinus. A number of cranes, as the poets say, resorted on its banks in the summer time.

STRYPE (John), born in London, of German parents, was educated at Catherine hall, Cambridge, and in 1669 was presented to the living of Theydon-boys, Essex, which he resigned for Low Leyton. He also was lecturer of Hackney, where he died 1737, at a great age. He published the lives of archbishops Cranmer, Grindal, Parker, and Whitgift, of Aylmer, bishop of London, of sir Thomas Smith, of sir J. Cheke, and also ecclesiastical memoirs, 3 vols.—annals of the reformation, 4 vols. folio, &c.

STUART (James), an architect, born in London 1713. The death of his father left him in very indigent circumstances, but his genius shone forth, and his abilities were successfully exerted to support his father's orphan family by painting fans. While thus engaged, he directed his attention to the acquisition of other branches of science, and obtained a perfect knowledge of anatomy, geometry, painting, the mathematics, and architecture, to which he joined Greek and Latin. After his mother's death he settled his brother and sisters in a comfortable situation, and with scanty resources set out to visit Rome and Athens. He mostly travelled on foot, and when he reached Italy, he formed an intimacy with Mr. N. Revett, an able architect and painter, with whom he continued his journey to Athens, and there for five years, till 1755, was employed in making drawings, and in taking the measures of the remarkable places of this venerable city. Their perseverance was encouraged by sir Jacob Bouverie and Mr. Dawkins, then at Athens. The result of their labours appeared in 1 vol. folio, 1762, under the title of the Antiquities of Athens, measured and delineated by I. Stuart and N. Revett. This publication recommended Stuart; he was noticed by Anson, Rockingham and others, and appointed surveyor of Greenwich hospital. This respectable character died at his house in Leicester-square, 1788, aged 76. Two more volumes have appeared since his death, one in 1790 published by Newton, the other in 1794 by Mr. Revely.

Stuart (Gilbert), an historian, born in 1742, at Edinburgh. He was well educated for the law, which his natural indolence made him abandon for elegant literature. Before his 22d year, he published his historical dissertation concerning the antiquity of the British constitution; so admired that the university granted him the degree of LL.D. He next published his view of society in Europe, in its progress from rudeness to refinement; and when disappointed in applying for a law professorship, he came to London, where, from 1768 to 1774, he wrote for the monthly review. In 1774 he returned to Edinburgh, but his attempts to establish there a review failed, and in 1782 he again came to London, and took a share in the political herald, and the English review. Intemperance brought on complicated disorders, and when labouring under the jaundice and the dropsy, he returned to Scotland by sea, and died in his father's house, in August 1786. He published besides, observations concerning the public law, and constitutional history of Scotland—the history of the reformation in Scotland, in which he most scandalously vilified the character of John Knox;—the history of Scotland from the reformation to Mary's death, in which he ably defends her character against Dr. Robertson and other writers.

In his person Dr. Stuart was about the middle size and justly proportioned. His countenance was modest and expressive, sometimes glowing with sentiments of friendship, of which he was truly susceptible, and at others darting that satire and indignation at folly and vice, which appear in some of his writings. He was a lively companion; but, with a constitution that might have stood the shock of ages, he fell a premature martyr to intemperance. His talents were certainly great, and some of his writings useful; but he seems to have been influenced more by passion than prejudice, and in his character there was not much to be imitated.

STUARTIA, in botany, a genus of the class monadelphia, order polyandria. Calyx single, wheel-shaped; petals five; styles five, united or distinct; capsule five-celled, five-valved; seeds one or two. Two species, natives of North America, of which one, S. malachodendron, is cultivated in our own shrubberies: it is a shrub with spear-shaped, serrate leaves, and white flowers; rising with strong ligneous stalks ten or twelve feet high.

STUB. *s.* (ꞅꞇeb, Saxon; *stubbe*, Danish.) 1. A thick short stock left when the rest is cut off (*Dryden*). 2. A log; a block (*Milt.*).

To Stub. *v. a.* (from the noun.) To force up; to extirpate (*Swift*).

STU'BBED. *a.* (from *stub.*) Truncated; short and thick (*Drayton*).

STU'BBEDNESS. *s.* (from *stubbed.*) The state of being short, thick, and truncated.

STU'BBLE. *s.* (*estouble*, French; *stoppel*, Dutch.) The stalks of corn left in the field by the reaper (*Bacon*).

STU'BBORN. *a.* (from *stub.*) 1. Obstinate; inflexible; contumacious (*Shakspeare*). 2. Persisting; persevering; steady (*Locke*). 3. Stiff; not pliable; inflexible; not easily admitting impression (*Dryden*). 4. Hardy; firm (*Swift*). 5. Harsh; rough; rugged (*Burnet*).

STU'BBORNLY. *ad.* Obstinately; contumaciously; inflexibly (*Garth*).

STU'BBORNNESS. *s.* (from *stubborn.*) Obstinacy; vicious stoutness; contumacy; inflexibility (*Swift*).

STU'BBY. *a.* (from *stub.*) Short and thick; short and strong (*Grew*).

STU'BNAIL. *s.* (*stub* and *nail.*) A nail broken off; a short thick nail.

STUCCO, in masonry, a lapidifying cement composed of lime, sand, grit, gypsum, puzzolane, tarras, or similar materials, mixed into a paste or plaster with lime-water, and often, where greater durability or a closer attachment is required, combined with metallic oxyds, and the caseous part of milk.

A cheap and durable stucco is an object of very great importance in architecture of almost all kinds, and innumerable inventions have been attempted upon the subject. In the Transactions of the Society for the Encouragement of Arts, Commerce, &c. for 1811, we find the following, invented by H. B. Way, esq. of Bridport, strongly recommended, and apparently not without just reason: one part chalk lime, and three parts fine sand collected on the sea-shore, near Bridport Harbour, the whole mixed up to a proper consistence with strong lime water. Both the lime and sand should be finely sifted; and when used as stucco, the first coat to be laid on half the thickness of a crown-piece; let it remain two days, then with a painter's brush wash it over with strong lime water, and lay on the second coat of the same thickness.

The cost of this is indeed very low; it is thus calculated by Mr. Way as his own expence.

	s.	d.
One sack and a quarter of lime, at 2*s.* 6*d.* - - - -	3	1½
Two men and one boy two days each, fetching and mixing up materials, and laying on; men 2*s.* 3*d.* per day, boy 10*d.* per day, and one pint of ale each per day, 12*d.* - - - -	11	10½
	15	0

The space of wall covered with these materials amounted to twenty-five square yards; which is not more than 7½*d.* per yard. It was the outside wall of the inventor's house which was covered with this stucco, in a situation greatly exposed to the spray of the sea and bad weather; yet he adds, though writing five years after its application, that by means of this stucco his house is perfectly free from damp, and the plaster still remains compact and durable.

It is highly probable that the above stucco may, for many years to come, answer very well for the situation in which it has been employed; but, where the cement is required to be harder, or is wanted to resist water, it should be combined with a portion of some metallic oxyd, as iron or lead, which give it a firmness equal to that of freestone: and hence the advantage of employing tarras or puzzolane in the composition of stuccoes or mortars for this purpose; this singular material being nothing more than a kind of ferruginous clay, or clay combined intermixed with iron oxyd, baked and calcined by the force of volcanic fire, and hence reduced to the form of a light, porous, friable mineral. It is usually obtained from the neighbourhood of Puteoli, and is thrown forth from the craters of Vesuvius. The only preparation it undergoes is that of pounding and sifting, by which it is comminuted to a coarse powder, after which it is beaten up into a due degree of consistency with a certain portion of lime, sometimes with and sometimes without sand. This kind of cement is of considerable antiquity: it was commonly employed by the Romans along the skirts of the bay of Baiæ, the most fashionable watering-place of this celebrated people, during their most luxurious æra, in constructing the walls of their summer villas, which were often erected immediately on the shore. It was employed by Mr. Smeaton in building the Edystone lighthouse, in the proportion of equal parts of puzzolane, and slacked Aberthaw lime, and is well known to have answered his fullest expectation. For works less exposed, however, as locks and basons for canals, the proportion of puzzolane may be diminished; and the cement employed on such occasions, and with great success, is the following: slacked Aberthaw lime two bushels, puzzolane one bushel, clean sand three bushels; the whole being beaten well together with the proper quantity of water so as to yield 4.67 cubic feet of stucco.

It is in consequence of the property we have just ascribed to metallic oxyds of giving solidification to stuccoes that the scales detached by hammering red-hot iron, and which are to be easily procured at the forges and blacksmiths' shops, are found so advantageous in compositions of this kind. Mr. Smeaton found by repeated experiments, that these pounded and sifted, and incorporated with lime, produce a cement equal to puzzolane combined with lime in the same proportion. This material, he perceived also, renders common mortar capable of setting under water. Roasted iron-ore was found to answer the same purpose.

Coincidently with these facts Mr. Kirwan observes, that "Zimmerman mixed one part filings of iron, and three parts sand, and sprinkled, or rather covered them with water, and let them stand six months, at the end of which period he found the vessel burnt by the expansion of the oxygenated iron, and the sand so firmly compacted, that the mass thus formed could not be broken but by a chisel and hammer. Henckel, Origine des Pierres, p. 405 in note. And that this induration may and does take place at great depths in the sea is evidently proved by the observations of Kinman (Mem. Stockh. 1780, related by Gadd), that an iron anchor long deposited in the sea had hardened into stone all the sand, clay, and shells which surrounded it, to a pretty considerable distance; and is further confirmed by a similar observation of Mr. Edward King, Phil. Trans. 1779, p. 35, that a violent storm having laid bare part of the wreck of a man of war that had been stranded thirty-three years before, several masses, consisting of iron, ropes, and balls, were found covered over with a hard substance, which, upon examination, appeared to be sand concreted and hardened into a kind of stone; that which concreted round the rope retained the impression of that part of the ring to which the rope was fastened, in the same manner as the impressions of extraneous fossils are often found in various strata. Also round the iron handle of a brass cannon that remained in the sea a much longer time, a much harder incrustation of sand was found, inclosing cockles, muscles, limpets, oysters, &c. all so firmly fixed and converted into a substance so hard, that it required as much force to break them as to break the substance of any hard rock." Geol. Essays, p. 129.

A very valuable and curious preservation stucco was invented about fifty years ago by M. Bachalier of Paris, which was capable of being used in a very liquid state, so as not to injure the finest and most delicate sculpture, which, indeed, it was the direct object of this composition to protect. In this the metallic oxyd seems to have been lead, and one of the principal ingredients the caseous part of cheese, so frequently used in our own country as an ingredient in cement for uniting broken pieces of glass and china. This stucco-composition of M. Bachalier has of late years been esteemed of so much value in France, that a committee of the first French chemists, Berthollet, Chaptal, Vauquelin, Le Briton, and Gayton-Merveau, have been appointed by the Imperial Institute to examine into its component parts, of whose report we shall offer the following abridgment.

"It was in 1755 that Mr. Bachelier, struck with the speedy alteration of the stones employed in the principal buildings at Paris, and the inconveniencies of the process employed from time to time to renew their surfaces, proposed to the superintendant of the royal buildings to try a preservative stucco. Accordingly three pillars in the court of the Louvre were coated with this stucco for half their length, two facing the south, the other the west. These were still remarkable in July last for the uniformity of their tint, strongly distinguished from the dull gray and earthy aspect of the contiguous parts: but as the alterations made in completing the Louvre would necessarily destroy every trace of this experiment, the Institute appointed a committee to inquire concerning it before it should be too late.

"In company with Mr. Fontaine, architect of the Louvre, the gentlemen abovementioned examined the pillars, and found that the stucco applied formed a coat too thin to injure the finishing of the most delicate sculpture; that it retained a uniform colour even in the parts exposed to the action of the wind, rain, and sun; that rubbing it with the hand made no impression on it; and that, if one of the three pillars exhibited a reddish yellow tint, there could be no doubt, from its appearance in other respects, that this was owing to some colouring matter added intentionally.

"It could not be found on inquiry, that Mr. Bachalier had consigned his process to writing, and the following was the best account his son could give of it from memory. 'Its basis consists of the sifted powder of oystershells, previously washed and calcined to whiteness, mixed with the butyraceous and caseous part of milk. My father used the common cheese known by the name of *fromage à la pie* (skimmed milk cheese). He first separated all the wheyey part by pressure, and then left it some time exposed to the air to dissolve or soften. In this state he mixed with it a quantity of calcined oystershells in fine powder. When this mixture was brayed on a stone, the cheese softened, and formed a very smooth and whitish liquid paste. To make the stucco he diluted this with a solution of alum in water; the quantity of water being proportioned according to the thickness of the coat intended to be applied.'

"Mr. Bachelier could say nothing of the proportions of the ingredients, he only added, that, his father having thought of employing this composition undiluted to cover leaves of paper, from which writing was easily effaced by a wet sponge, he observed, that the oystershell powder was taken at random, and added to the cheese till it had acquired the consistency of a paste capable of being spread on paper.

"The committee having obtained from Mr. Bachelier a few leaves of paper covered with thin paste, found from the very deep black immediately given it by the hydrosulphuret of potash, that it contained a considerable quantity of oxyd of lead, the presence of which there was no reason to suspect in the preservative stucco, so that they could not be considered as the same.

"It remained therefore to analyse the stucco, which was done by Mr. Vauquelin; though, as a very small quantity only could be obtained by scraping the pillars, it did not admit of repeated trials. The results of his analysis gave

Carbonat of lime - - - - -	63
Sulphat of lime - - - - - -	7·73
Carbonat of lead - - - - - -	6
Oxyd of iron, about - - - - -	4
Silex - - - - - - - - - -	2
Water - - - - - - - - - -	20
Organic matter, an indeterminate quantity	
	102·73

"The surplus of 2·73 Mr. Vauquelin ascribes either to the matter not having been dried to the same degree, or to the escape of a little carbonic acid during the calcination.

"The presence of animal matter was sought for, but not a particle could be separated. The smell it emitted during calcination no way resembled that of animal matters; on the contrary it had the pungent sharpness of vegetable substances. On being exposed to the action of heat in a retort, however, a clear and almost colourless liquid came over, from which potash expelled a very evident ammoniacal vapour. This indicates that some animal substance entered into the composition, but that in time it was decomposed, and left only an ammoniacal salt. The brownish colour it acquired in the fire also proves, that some animal matter still remained in it, though altered in its nature, since it neither emitted the smell proper to such substances, nor yielded any perceptible quantity of oil.

"Lastly, this matter yielded no appreciable quantity of alumine, so that it may be presumed no alum was employed in the composition.

"Mr. Bachelier having some of the paper that had been prepared by his father, the coating of this was analysed, and the result indicated, that

Quicklime - - - - - - -	56·66
Calcined gypsum - - - - -	23·34
Ceruse or carbonat of lead - -	20

had entered into its composition.

"On these proportions more dependance can be placed than on the former, since it was impossible to detach the plaster from the pillars without some of the substance of the stone itself.

"That the caseous part of the milk is the proper vehicle for the powders we learn from the positive testimony of Mr. Bachelier, the son; and its utility is confirmed by the experiments of Mr. d'Arcet published some years ago.

"Of the efficacy of Mr. Bachelier's composition there can be no doubt, as we have irrefragable and still existing testimony of it; nor would it be difficult to estimate this beforehand, when we consider the causes that produce the gradual decay of the finest buildings in this capital, and the means of guarding against them.

"Hard and fine grained calcareous stone, susceptible of a greater or less degree of polish, is not liable to this alteration. It is therefore owing to the nature of the stone commonly employed, which is of a loose and unequal texture, filled with cavities, and found by analysis to contain 10 or 12 per cent of silex, and frequently 3 or 4 of oxyd of iron. The difference of the stones from the quarries near Paris is evident from the tables of Mr. Rondelet, in his Treatise on the Art of Building; where we see, for example, that what is called the grignard of Passy is of the specific gravity of 2·462, and supports a weight of 6750 kil.;

while the lambourde of St. Germain has only 1·560 sp. grav., and is crushed by a weight of 921 kil. The prices of these two kinds of stone differ too in the proportion of 26 to 10.

"It is not at all strange that the little spider called by Linnéus senoculata, the cellar spider of Geoffroy, should find on the surface of this stone a convenient situation to shelter itself, deposit its eggs, and spread the nets in which it awaits its prey. Its web extends circularly round the cavity, that serves as its den, forming round spots of 3 or 4 cent. (1 in. or 1½) radius. It is not thirty years since the *hotel des monnoies* was built, and I have counted no less than sixty-eight of these dark gray spots on one of the pillars of the vestibule. Similar ones are found not only on the stone, but on the coatings of plaster, and on the walls covered with common stucco. It is particularly in the joints and angles that the insect begins to fix itself. I have seen several on walls, the stucco of which had been coated afresh within less than seven years. These spots at length form a continued coat, retaining the sloughs of these insects, the remains of those on which they feed, and the dust raised by the wind, so that lichens soon take root in them.

"If it be asked, how is this to be prevented? the answer is easy. By a composition that resists water, will adhere to the stone so as not to scale off, has a sufficient degree of consistency to stop the pores accurately, is liquid enough to be spread as a wash, and uniformly to ice over, as it were, all the saliant and indented parts without thickening the angles or blunting the edges, and lastly which gives to the assemblage of coarse grains the smooth surface of polishable stones, in which it appears these insects cannot nestle. And this we think may be expected from Mr. Bachelier's stucco.

"Meantime I must observe, that, in the present state of our chemical knowledge, other means of fulfilling these conditions may be pointed out. We know, for instance, that phosphat of lime is one of the most fixed combinations: it would be sufficient, therefore, to wash over the stone with phosphoric acid more or less diluted, or with phosphat of lime, lead, magnesia, &c., held in solution by an excess of their acid, to give it a sort of covering that would render it as unalterable as the stone of Logozan in Estramadura. It is equally known that sulphat of barytes resists all agents in the humid way; and we might certainly coat the stone with this earthy salt, by first impregnating it with a solution of sulphat of iron, zinc, magnesia, alumine, &c., and immediately washing it over with barytes water. The insolubility of oxalats and tartrats of lime, and the adhesion they contract by deposition even on polished substances, suggest processes for washes not less solid, as the acids added to these salts to render them temporarily soluble, saturating themselves with their base from the substance of the stone itself, would not fail to connect together all the grains, fill up their intervals, and completely close the pores. Trials made with a view to ascertain the justice of this reasoning have confirmed the expectation of a successful result; since on the most porous stones they have produced a surface, on which the eye could see no appearance of coating, but which, being rubbed with wet black cloth till the cloth showed signs of wear, was not in the least soiled by it.

"Preparations of this kind, however, would be much more expensive than Bachalier's stucco, so that their use must be restricted to the preservation of sculpture of extreme delicacy.

"For farther satisfaction trials have been made with different kinds of stone, and stucco made in imitation of Bachelier's. These have given rise to the following observations.

"1. All the compositions in which alum water was employed soiled the fingers, and were washed off by water.

"2. The cheese that acquires the greatest consistency with dry substances is that which is almost entirely deprived of the butyraceous and wheyey parts. Mr. d'Arcet, in the paper already quoted, had remarked, that these were more detrimental than useful, that painting with milk would not resist water, and that the cheese called *fromage à la pie* might be used after it had grown dry, though less advantageously than when fresh made and well drained.

"3. A mixture of this cheese with lime simply forms a paste that adheres but slightly even to coarse grained stone, and not at all to paper.

"4. Calcined gypsum, which in a small dose facilitates the union of the lime and cheese, renders the paste hard and clotty if it be used in too large proportion.

"5. It had appeared that whiting, which is used in paper hangings, might be admitted into the preparation: but it was found that if this earthy substance, which in a process described by Mr. d'Arcet is carried to twenty times the weight of the lime, may be used with success for inside work, it would make too thick a coat, and would not adhere so strongly to the stone.

"6. The addition of a very little ochre, or red oyxd of iron, to this preparation, will give it such a tint as may be wished, without altering its properties.

"The proportion of cheese must depend in some measure on the state in which it is, and cannot be determined precisely but by the condition of making a soft paste. A fourth of the weight of the solid matters appears to be a sufficient quantity of cheese fresh from the press.

"The quantity of lime to be used at once being determined on, it is to be slaked in as little water as possible, but enough to make it pass through a sieve not very fine, in order to separate the parts that will not slake. This is to be triturated with the cheese to the consistence of a soft, smooth, and coherent paste. To this are to be added the calcined gypsum and the white lead, which must not be adulterated with chalk, and by farther grinding on the stone with a little water the whole is be reduced to a pap, rather thick than fluid. Lastly, it is to be diluted with common water the moment of using it, which is to be done with a painter's or varnisher's brush."

STUCK. The pret. and part. pass. of *stick*.

Stuck. *s.* A thrust (*Shakspeare*).

STU'CKLE. *s.* A number of sheaves laid together in the field to dry (*Ainsworth*).

STUD. *s.* (ꞅꞇuꝺu, Saxon.) 1. A post; a stake (*Mortimer*). 2. A nail with a large head driven for ornament; any ornamental knob or protuberance (*Swift*). 3. (ꞅꞇoꝺe, Saxon.) A collection of breeding horses and mares (*Temple*).

To **Stud.** *v. a.* (from the noun.) To adorn with studs and shining knobs (*Shakspeare*).

Stud-book, a repository of the pedigree of horses, transmitted from one generation to another, and preserved by the proprietor of every racing stud of eminence in the kingdom; in which may be retraced the exact lineal descent of each horse or mare, from the earliest time in which racing blood began to become fashionable. From a large collection of these, Mr. Weatherby has given to the public a full and well-authenticated pedigree of between four and five thousand of the best bred horses that have raced and covered in England, Scotland, and Ireland.

STU'DENT. *s.* (*studens*, Lat.) A man given to books; a scholar; a bookish man (*Watts*).

STU'DIED. *a.* (from *study*.) 1. Learned; versed in any study; qualified by study (*Bacon*). 2. Having any particular inclination (*Shakspeare*).

STU'DIER. *a.* (from *study*.) One who studies (*Tillotson*).

STU'DIOUS. *a.* (*studieux*, Fr. *studiosus*, Lat.) 1. Given to books and contemplation; given to learning (*Locke*). 2. Diligent; busy (*Tickel*). 3. Attentive to; careful (*Dryden*). 4. Contemplative; suitable to meditation (*Milton*).

STU'DIOUSLY. *ad.* (from *studious*.) 1. Contemplatively; with close application to literature. 2. Diligently; carefully; attentively (*Atterbury*).

STU'DIOUSNESS. *s.* (from *studious*.) Addiction to study.

STU'DY. *s.* (*studium*, Latin.) 1. Application of mind to books and learning (*Watts*). 2. Perplexity; deep cogitation (*Bacon*). 3. Attention; meditation; contrivance (*Shaks.*). 4. Any particular kind of learning (*Bacon*). 5. Subject of attention (*Law*). 6. Apartment appropriated to literary employment (*Claren.*).

To **Stu'dy.** *v. n.* (*studio*, Latin.) 1. To think with very close application; to muse (*Swift*). 2. To endeavour diligently (*Thess.*).

To **Stu'dy.** *v. a.* 1. To apply the mind to (*Locke*). 2. To consider attentively (*Dryden*). 3. To learn by application (*Shakspeare*).

STUFF. *s.* (*stoffe*, Dutch.) 1. Any matter or body (*Davies*). 2. Materials out of which any thing is made (*Roscommon*). 3. Furniture; goods (*Cowley*). 4. That which fills any thing (*Shakspeare*). 5. Essence; elemental part (*Shakspeare*). 6. Any mixture or medicine (*Shakspeare*). 7. Cloth or texture of any kind. 8. Texture of wool thinner and slighter than cloth (*Bacon*). 9. Matter or thing. In contempt (*Dryden*).

To **Stuff.** *v. a.* (from the noun.) 1. To fill very full with any thing (*Gay*). 2. To fill to uneasiness (*Shakspeare*). 3. To thrust into any thing (*Bacon*). 4. To fill by being put into any thing (*Dryden*). 5. To swell out by putting something in (*Shakspeare*). 6. To fill with something improper or superfluous (*Clarendon*). 7. To obstruct the organs of scent or respiration (*Shakspeare*). 8. To fill meat with something of high relish (*King*). 9. To form by stuffing (*Swift*).

To **Stuff.** *v. n.* To feed gluttonously (*Swift*).

STU'FFING. *s.* (from *stuff*.) 1. That by which any thing is filled (*Hale*). 2. Relishing ingredients put into meat (*Mortimer*).

STUHLWEISSENBURG, a town of Hungary, and the see of a bishop, situate in marshy ground, occasioned by the river Sarwitz. It was formerly the place for the coronation of the kings, and generally also of their interment; but it is much decayed, since its works were dismantled in 1792. The number of inhabitants is estimated at 11,000. It is 30 miles S.W. of Buda, and 80 S.E. of Presburg. Lon. 18. 28 E. Lat. 47. 18 N.

STUKE. See Stucco.

STUKELEY (Dr. William), a celebrated antiquarian, descended from an ancient family in Lincolnshire, was born at Holbeach in 1687, and educated in Bene't college, Cambridge. While an under-graduate, he often indulged a strong propensity to drawing and designing; but made physic his principal study, and first began to practise at Boston in his native county. In 1717 he removed to London, where, on the recommendation of Dr. Mead, he was soon after elected a fellow of the Royal Society: he was one of the first who revived that of the Antiquarians in 1718, and was their secretary for many years during his residence in town. In 1729 he took holy orders by the encouragement of archbishop Wake; and was soon after presented by lord-chancellor King with the living of All-Saints in Stamford. In 1741 he became one of the founders of the Egyptian Society, which brought him acquainted with the benevolent duke of Montague, one of the members; who prevailed on him to leave Stamford, and presented him to the living of St. George the Martyr, Queen-square. He died of a stroke of the palsy in 1765. In his physical capacity, his Dissertation on the Spleen was well received; and his Itinerarium Curiosum, the first fruit of his juvenile excursions, was a good specimen of what was to be expected from his riper age. His great learning, and profound researches into the dark remains of antiquity, enabled him to publish many elaborate and curious works: his friends used to call him the arch-druid of his age. His discourses, intitled Palæographia

Sacra, on the vegetable creation, bespeak him a botanist, philosopher, and divine.

STULTI'LOQUENCE. *s.* (*stultus* and *loquentia*, Latin.) Foolish talk.

STUM. *s.* (*stum*, Swedish.) 1. Wine yet unfermented; must (*Addison*). 2. New wine used to raise fermentation in dead and vapid wines (*Ben Jonson*). 3. Wine revived by a new fermentation (*Hudibras*).

To Stum. *v.a.* (from the noun.) To renew wine by mixing fresh wine and raising a new fermentation (*Floyer*).

To STU'MBLE. *v. n.* (from *tumble.*) 1. To trip in walking (*Prior*). 2. To slip; to err; to slide into crimes or blunders (*Milton*). 3. To strike against by chance; to light on by chance (*Ray*).

To Stu'mble. *v. a.* 1. To obstruct in progress; to make to trip or stop. 2. To make to boggle; to offend (*Locke*).

Stu'mble. *s.* (from the verb.) 1. A trip in walking. 2. A blunder; a failure (*L'Estr.*).

STU'MBLER. *s.* (from *stumble.*) One that stumbles (*Herbert*).

STUMBLING, in a horse, occurs either naturally or accidentally. The fore-legs of a stumbling horse are too straight, so that he is not able to use them with proper freedom. To shoe a horse which stumbles is a nice point. You must shoe him quite contrary to those horses which tread only upon the toes of their hind-feet; for you must take down his toe very much, and also shorten it, that he may not meet so easily with impediments and stones upon the highways. Solleysel and others advise this, though we doubt its efficacy.

STU'MBLINGBLOCK. Stu'mbling-stone. *s.* (from *stumble.*) Cause of stumbling; cause of errour (*Burnet*).

STUMP. *s.* (*stumpe*, Dan. *stompe*, Dutch.) The part of any solid body remaining after the rest is taken away (*Drayton*).

STU'MPY. *s.* (from *stump.*) Full of stumps; hard; stiff. A bad word (*Mortimer*).

To STUN. *v. a.* (ꞅꞇunan, Saxon.) 1. To confound or dizzy with noise (*Cheyne*). 2. To make senseless or dizzy with a blow (*Dryd.*).

STUNG. The pret. and part. pass. of *sting.*

STUNK. The preterit of *stink.*

To STUNT. *v. n.* (*stunta*, Islandic.) To hinder from growth (*Pope*).

STUPE. *s.* (*stupa*, Latin.) Cloth or flax dipped in warm medicaments, and applied to a hurt or sore (*Wiseman*).

To Stupe. *v. a.* (from the noun.) To foment; to dress with stupes (*Wiseman*).

STUPEFA'CTION. *s.* (*stupefactus*, Lat.) Insensibility; dulness; stupidity (*South*).

STUPEFA'CTIVE. *a.* (from *stupefactus*, Lat.) Causing insensibility; dulling; obstructing the senses; narcotic; opiate (*Bacon*).

STUPE'NDOUS. *a.* (*stupendus*, Latin.) Wonderful; amazing; astonishing (*Claren.*).

STU'PID. *a.* (*stupidus*, Latin.) 1. Dull; wanting sensibility; wanting apprehension; heavy; sluggish of understanding (*Dryden*). 2. Performed without skill or genius (*Swift*).

STUPI'DITY. *s.* (*stupiditas*, Latin.) Dulness; heaviness of mind; sluggishness of understanding (*Dryden*).

STU'PIDLY. *ad.* (from *stupid.*) 1. With suspension or inactivity of understanding (*Milton*). 2. Dully; without apprehension (*Dryden*).

STU'PIFIER. *s.* (from *stupify.*) That which causes stupidity.

To STU'PIFY. *v. a.* (*stupefacio*, Latin. It should therefore be spelled *stupefy.*) To make stupid; to deprive of sensibility (*South*).

STU'POR. *s.* (Latin.) Suspension or diminution of sensibility (*Arbuthnot*).

To STU'PRATE. *v. a.* (*stupro*, Latin.) To ravish; to violate.

STUPRA'TION. *s.* (*stupratio*, from *stupro*, Latin.) Rape; violation (*Brown*).

STURA, a new department of France, including part of Piedmont. It has its name from a river, which rises on the W. border and flows by Coni and Fossano to Cherasco, where it joins the Tanaro. The capital is Coni.

STU'RDILY. *ad.* (from *sturdy.*) 1. Stoutly; hardily. 2. Obstinately; resolutely (*Donne*).

STU'RDINESS. *s.* (from *sturdy.*) 1. Stoutness; hardiness (*Locke*). 2. Brutal strength.

STU'RDY. *a.* (*estourdi*, Fr.) 1. Hardy; stout; brutal; obstinate (*Dryden*). 2. Strong; forcible (*Sidney*). 3. Stiff; stout (*Wotton*).

STURGEON, in ichthyology. See Acipenser.

STURK. *s.* (ꞅꞇẏꞃc, Saxon.) A young ox or heifer (*Bailey*).

STURM, Sturmius (John Christopher), a noted German mathematician and philosopher, was born at Hippolstein in 1635. He became professor of philosophy and mathematics at Altdorf, where he died in 1703, at 68 years of age.

He was author of several useful works on mathematics and philosophy, the most esteemed of which are, 1. his Mathesis enucleata, in one vol. 8vo; 2. Mathesis Juvenilis, in two large volumes 8vo; 3. Collegium Experimentale, sive Curiosum, in quo primaria Seculi superioris Inventa et Experimenta Physico-Mathematica, Speciatim Campanæ Urinatoriæ, Cameræ obscuræ, Tubi Torricelliani, seu Baroscopii, Antliæ Pneumaticæ, Thermometrorum Phænomena et Effecta; partim ac aliis jampridem exhibita, partim noviter istis superaddita, &c. in one large volume 4to, Norimberg, 1701.

This is a very curious work, containing a multitude of interesting experiments, neatly illustrated by copper-plate figures, printed upon almost every page, by the side of the letter-press. Of these, the 10th experiment is an improvement on father Lana's project for navigating a small vessel suspended in the atmosphere by several globes exhausted of air.

STURNUS. Stare; starling. In zoology, a genus of the class aves, order passeres. Bill subulate, angular, depressed, bluntish; the upper mandible entire, somewhat open at the edges; nostrils surrounded with a prominent rim; tongue notched, pointed. Seventeen species, scattered over the globe; two only common to our own country. We shall give a few examples.

1. S. vulgaris. Common starling. Bill yellowish; body black, with white dots. Inhabits Europe, Asia, and America, and common to our own country. Nine inches long. These birds are distinguished by a strong appetite for society. During the winter months, they crowd together in such close and well arranged battalions, that no bird of prey dares to penetrate their ranks. This manner of flight, which defends them against the rapacious birds, renders them a more easy prey to the wiles of the bird-catcher, who dispatches among them a number of birds of their own kind, each having a glued thread tied to its leg, by which some of them are entangled, and brought to the ground.

Their love of society not only prompts them to associate with birds of their own species, but also with others nowise allied to their tribe. In spring and autumn, they are frequently seen in company with crows and choughs, and sometimes even flocking with pigeons. It is, however, principally towards the night that the starlings unite in very large companies, as if to put themselves in sufficient force to brave its dangers. Then they assemble in a flock, and after various evolutions, rush with impetuosity into the midst of the thicket, where they spend the evening with copious chattering, till darkness puts an end to their conversation. In the morning, about day-break, this noisy conference is resumed, till they depart or separate in search of food.

The pairing season among these birds commences in March; but as in other instances, the tender union is accomplished by force, and decided by combat. The females have no choice; they stand at a distance, spectators of the battles they occasion, and tamely yield themselves up, as the reward of superior bravery or strength. After fecundation, they lay four or five eggs, of a pale green, in a nest constructed in the hollow of a tree, in a ruinous edifice, or cliff of a rock.

They are seldom at the trouble of building for themselves, but generally take possession of the deserted nest of some other bird. Even the repairs that may be necessary are carried on in a very slovenly manner: a few dried leaves, or piles of withered grass, overlaid with moss, are all that the starling deems necessary for the accommodation of its family. When the nest is in a dove-house, as sometimes is the case, or in the hole of a rock, still less art is bestowed in constructing it.

The old ones, as well as the young, live upon insects and worms, and their flesh is so remarkably bitter as to be scarcely eatable. To this kind of food they add corn, and every kind of garden fruit, as often as their residence happens to be in a cultivated country. Raisins and cherries are supposed to be the best correctives of the bitterness of their flesh, which is occasioned by the excessive quantities of bile secreted in their livers.

Their docility, and the beauty of their plumage, have rendered them great favourites. They have been often taught to speak and sing song-tunes: and it must be confessed that the muscles and organs of the throat seem flexible, and proper for every kind of articulation. Their vocal powers are, however, mostly acquired by education; and, in the domestic state, they support a musical character much better than in the wild. The feathers on the head, neck, and upper part of the back, are black, varied with a beautiful green and purple, according as they are opposed to different lights; the form of the feathers in general being long and narrow, tipped at the point with small spots of yellow or white.

There is in the productions of nature a continual tendency to variety, which is clearly exemplified in most of the tribes of birds, and which the distinct and almost insulated characters of the starling have not been able to defeat. There are some of this genus black, others white, and others still, which display the various mixture of those two colours. White and black starlings are said to have been found in the same nest.

2. S. Capensis. Cape starling. Blackish, beneath and sides of the head white. Inhabits the Cape of Good Hope: size of the last. The black and white, which are the only colours of this bird, are distributed in a manner similar to those of our pies. The bill is thicker and longer than that of the European starling, and its distinguishing marks are two large white spots of a round form on each side of the head: in the middle of these are placed the two ears.

3. S. Ludovicianus. Louisiane starling. The starlings of Louisiana are observed in vast flocks in the interior regions of North America. By their manner of flight, as well as their shape, they indicate a near approach to our European kinds. The lower parts of the body are yellow, the upper brownish grey; and they are distinguished by a large dark-coloured spot upon the breast. There are various other birds allied to the starling, in Mexico, and in several parts of South America. The American starlings are inferior to those of Europe in the powers of song; but an ingenious naturalist has made a good apology for this defect, by alleging, that as all the American birds have hoarse voices, and as the starling only acquires his music by imitation, he must, of course, in America, be a harsh performer. He even insinuates that our starling, were he transported among these screaming tribes, would lay aside his vocal notes, and join in their grating strains.

4. S. cinclus. Water-ouzel. Crake. Black; breast white; chin white; tail black; belly ferruginous, in the young bird white; legs pale blue before, black behind. Inhabits Europe and Northern Persia, and found in our own country. Seven and a quarter inches long: frequents waters, and feeds on aquatic insects and the smaller fishes; is very solitary, and breeds in the holes of banks; making a curious

nest of hay and fibres of roots, lined with dead leaves, and having an entrance of green moss.

STUTGARD, a city of Suabia, capital of the duchy of Wirtemburg. It is surrounded by walls and ditches, and has an ancient castle, with a rich cabinet of curiosities, a ducal palace, an orphan house, a college, a ducal academy and observatory, a military academy, and one of the largest libraries in Germany. It has manufactures of silks, stockings, ribands, &c. and around it are innumerable vineyards and gardens. The streets are narrow in the city, and the houses generally of wood; but there are fine houses, and straight streets, in one of the suburbs. Stutgard was taken by the French in June 1796, and in November 1799. It is seated in a plain among mountains, near the river Neckar, 36 miles E. of Baden, and 52 N.E. of Strasburg. Lon. 9. 21 E. Lat. 48. 44 N.

To STUT. *To* STU'TTER. *v. n.* (*stutten*, to hinder, Dutch.) To speak with hesitation; to stammer (*Bacon*).

STU'TTER. STU'TTERER. *s.* (from *stut.*) One that speaks with hesitation; a stammerer (*Bacon*).

STY. *s.* (ꞅꞇıᵹe, Saxon.) 1. A cabin to keep hogs in (*King*). 2. Any place of bestial debauchery (*Milton*). 3. A humour in the eyelid.

To STY. *v. a.* (from the noun.) To shut up in a sty (*Shakspeare*).

To STY. *v. n.* To soar; to ascend (*Spenser*).

STYE or STYTHE, a small but painful inflammation upon the eyelid.

STY'GIAN. *a.* (*stygius*, Latin.) Hellish; infernal; pertaining to Styx, one of the poetical rivers of hell (*Milton*).

STYLE. *s.* (*stylus*, Latin.) 1. Manner of writing with regard to language (*Swift*). 2. Manner of speaking appropriate to particular characters (*Shakspeare*). 3. Mode of painting (*Reynolds*). 4. It is likewise applied to music. 5. Title; appellation (*Clarendon*). 6. Course of writing. Unusual (*Dryden*). 7. STYLE *of Court*, is properly the practice observed by any court in its way of proceeding (*Ayliffe*). 8. A pointed iron used anciently in writing on tables of wax. 9. Any thing with a sharp point; as a graver, the pin of a dial (*Brown*).

STYLE. (from στυλος, a column.) In botany, pars pistilli, stigma elevans a germine: or, as it is expressed in another passage of Philos. Bot. —pes stigmatis, connectens illud cum germine. The middle portion of the pistil, connecting the stigma with the germ. It is called by some English botanists the shaft. We are to attend to the number, proportion, situation, division, and figure of styles.

The most common figures are—1. Capillary, or hair-shaped. 2. Filiform, or thread-shaped. 3. Cylindric. 4. Subulate, or awl-shaped. 5. Clavate, or club-shaped.

In situation they may be—1. Erect, or upright. 2. Declined, or bending down. 3. Ascending, or bending up.

STYLE, in chronology, a particular manner of counting time; as the Old Style, the New Style. See CALENDAR.

Old Style, is the Julian manner of computing, as instituted by Julius Cæsar, in which the mean year consists of 365¼ days.

New Style, is the Gregorian manner of computation, instituted by pope Gregory the 13th, in the year 1582, and is used by most catholic countries, and many other states of Europe.

The Gregorian, or new style, agrees with the true solar year, which contains only 365 days 5 hours 49 minutes. In the year of Christ 200, there was no difference of styles. In the year 1582, when the new style was first introduced, there was a difference of 10 days. At present there are 12 days difference, and accordingly at the diet of Ratisbon, in the year 1700, it was decreed by the body of protestants of the empire, that 11 days should be retrenched from the old style, to accommodate it for the future to the new. And the same regulation has since passed into Sweden, Denmark, and into England, where it was established in the year 1752, when it was enacted, that in all dominions belonging to the crown of Great Britain, the supputation, according to which the year of our Lord begins on the 25th day of March, shall not be used from and after the last day of December 1751; and that from thenceforth, the 1st day of January every year shall be reckoned to be the first day of the year: and that the natural day next immediately following the 2d day of September 1752, shall be accounted the 14th day of September, omitting the 11 intermediate nominal days of the common calendar. It is farther enacted, that all kinds of writings, &c. shall bear date according to the new method of computation, and that all courts and meetings, &c. feasts, fasts, &c. shall be held and observed accordingly. And for preserving the calendar in the same regular course for the future, it is enacted, that the several years of our Lord 1800, 1900, 2100, 2200, 2300, &c. except only every 400th year, of which the year 2000 shall be the first, shall be common years of 365 days, and that the years 2000, 2400, 2800, &c. and every other 400th year from the year 2000 inclusive, shall be leap years, consisting of 366 days. See BISSEXTILE and CALENDAR.

To STYLE. *v. a.* (from the noun.) To call; to term; to name (*Milton*).

STYLEPHORUS, in zoology, a genus of the class pisces, order apodalia. Eyes pedunculated, standing on a short, thick cylinder; snout lengthened, directed upwards, retractile towards the head by means of a membrane; mouth supposed to be without teeth; gills three pair beneath the throat; pectoral fins small; dorsal as long as the back; caudal short with spinous rays; body very long, compressed. One species only, S. chordatus, with its snout connected to the back part of the head by a flexible leathery duplicature, which permits it to be extended so that the mouth points upwards, or to fall back so as to be received into a sort of case formed by the upper part of the head; eyes close to each other, and with the short columns of a clear chesnut brown, with a coppery gloss; below the head on each side a considerable compressed semicircular space, the fore-part of which is bounded by the gill-cover, which seems to consist of a moderately strong membrane; body gradually diminishing as it approaches the tail, which terminates in a process or string of enormous length, ending in a very fine point; pectoral fins small, situate behind the cavity on each side the thorax; caudal fin with five spinous rays.

Inhabits the West Indian seas: whole length about thirty-two inches, of which the process at the end of the tail measures twenty-two; body rich silvery; flexible part belonging to the snout brown; fins and caudal process paler brown.

STYLET, a small and dangerous kind of poniard, which may be concealed in the hand; and having a triangular blade.

STYLIFORM. (*styliformis*, from *stylus*, a bodkin, and *forma*, a likeness.) Shaped like a bodkin or style.

STYLO. Names compounded of this word belong to muscles which are attached to the styloid process of the temporal bone; as,

S. GLOSSUS. (*musculus styloglossus.*) A muscle, situated between the lower jaw and os hyoides laterally, which draws the tongue aside and backwards. It arises tendinous and fleshy from the styloid process, and from the ligament which connects that process to the angle of the lower jaw, and is inserted into the root of the tongue, runs along its sides, and is insensibly lost near its tip.

S. HYOIDEUS. (*musculus hyoideus.*) A muscle, situated between the lower jaw and os hyoides laterally, which pulls the os hyoides to one side and a little upwards.

It is a small, thin, fleshy muscle, situated between the styloid process and os hyoides, under the posterior belly and middle tendon of the digastricus, near the upper edge of that muscle.

It arises by a long thin tendon, from the basis and posterior edge of the styloid process, and, descending in an oblique direction, is inserted into the lateral and anterior part of the os hyoides, near its horn.

The fleshy belly of this muscle is usually perforated, on one or both sides, for the passage of the middle tendon of the digastricus.

Sometimes, though not always, we find another smaller muscle placed before the stylohyoideus, which, from its having nearly the same origin and insertion, and the same use, is called stylo-hyoideus-alter. It seems to have been first known to Eustachius; so that Douglas was not aware of this circumstance, when he placed it amongst the muscles discovered by himself. It arises from the apex of the styloid process, and sometimes, by a broad and thin aponeurosis, from the inner and posterior part of the angle of the lower jaw, and is inserted into the appendix or little horn of the os hyoides.

The use of these muscles is to pull the os hyoides to one side, and a little upwards.

S. HYOIDEUS ALTER. See STYLO-HYOIDEUS.

S. MASTOID FORAMEN. A hole between the styloid and mastoid process of the temporal bone, through which the portio dura of the auditory nerve passes to the temples.

S. PHARYNGEUS. (*musculus pharyngeus.*) A muscle, situated between the lower jaw and os hyoides laterally, which dilates and raises the pharynx and thyroid cartilage upwards. It arises fleshy from the root of the styloid process, and is inserted into the side of the pharynx and back part of the thyroid cartilage.

STYLOSANTHES, in botany, a genus of the class diadelphia, order decandria. Calyx tubular, very long, bearing the corol; germ under the corol; loment one or two-jointed, hooked. Five species: for the most part viscid plants of the West Indies and America; one or two not viscid.

STYPHELIA, in botany, a genus of the class pentandria, order monogynia. Calyx imbricate, corol tubular, stamens inserted into the throat; drupe five-celled; seeds two together. Nine species; natives of New Holland or New Zealand.

STYPTICS. (*styptica*, ϛυφω, to adstringe.) A term given to those substances which possess the power of stopping hæmorrhages, such as turpentine, alum, &c.

STYPTI′CITY. *s.* The power of stanching blood.

STYRAX. Storax. In botany, a genus of the class decandria, order monogynia. Calyx inferior; corol funnel-form; drupe two-seeded. Four species, of which two are cultivated for the warm resinous gum that exudes from them. These are,

1. S. officinale. Officinal storax. Leaves ovate, villous underneath; racemes simple, shorter than the leaves; flowers white, five or six in a bunch. The tree rises in its native situation twelve or fourteen feet high. The common storax is the inspissated resin from this species. There are two kinds of storax to be found in the shops; the one is usually in irregular compact masses, free from impurities, of a reddish brown appearance, and interspersed with whitish tears, somewhat like gum ammoniac or benzoin; it is extremely fragrant, and upon the application of heat readily melts. This has been called storax in lump, red storax; and in separate tears, storax in tears. The other kind, which is called the common storax, is in large masses, very light, and bears no external resemblance whatever to the former storax, as it seems almost wholly composed of dirty saw dust, caked together by resinous matter. Storax was formerly used in catarrhal complaints, coughs, asthmas, obstructions, &c. In the present practice it is almost totally disregarded, notwithstanding it is an efficacious remedy in nervous diseases. The tree is a native of Syria.

2. S. benzoin. Gum benjamin tree. Leaves oblong, pointed, downy underneath; racemes compound, as long as the leaves. A native of Sumatra. Gum benjamin is the resin exuding

from its bark; for the medical virtues of which see the article BENZOIN.

STYRAX CALAMITA. See STYRAX.

STYRAX LIQUIDA. See LIQUIDAMBRA.

STYRAX OFFICINALIS. The systematic name of the tree which affords the solid styrax. See STYRAX.

STYTHY. *v. a.* To forge on an anvil.

STYX, a small river of Nonacris in Arcadia, whose waters were so cold and venomous, that they proved fatal to such as drank of them. They even consumed iron, and broke all vessels. The wonderful properties of this water suggested the idea that it was a river of hell, especially when it disappeared in the earth a little below its fountain head. The gods always swore by the Styx, an oath if any of the gods had violated, Jupiter obliged them to drink the waters of the Styx, which lulled them for one whole year in a senseless stupidity; for the nine following years they were deprived of the ambrosia and the nectar of the gods; and after the expiration of the years of their punishment, they were restored to the assembly of the deities, and all their original privileges.

SUABIA, a circle of Germany, bounded on the N. by Franconia and the circle of Lower Rhine, W. by that circle and Alsace, S. by Swisserland, and E. by Bavaria. It contains the duchy of Wirtemburg, the margravate of Baden, the principalities of Hoenzollern, Oetingen, Furstenburg, Mindelheim, Augsburg, and Constance, also Burgau, Brisgau, and some other territories.

SUAKEM or SUAQUAM, a seaport and the capital of the county of Abex, seated on a small island of the same name, in the Red sea. It is the residence of a Turkish governor under the bashaw of Cairo, and was once a very flourishing place, but is now gone to decay. Lon. 37. 55 E. Lat. 19. 56 N.

SUA'SIBLE. *a.* (from *suadeo*, Latin.) Easy to be persuaded.

SUA'SIVE. *a.* (from *suadeo*, Lat.) Having power to persuade (*South*).

SUA'SORY. *a.* (*suasorius*, Latin.) Having tendency to persuade.

SUA'VITY. *s.* (*suavitas*, Lat.) 1. Sweetness to the senses (*Brown*). 2. Sweetness to the mind.

SUB, in composition, is used frequently for almost, nearly, somewhat, thereabouts, approaching to, most commonly. We must consider the meaning of the word to which it is the prefix, in order to determine which of the English adverbs we should prefer. In some cases perhaps we may preserve the Latin prefix: in others we may use the English termination *ish:* as *subrotundus*, roundish. Though it were to have been wished, for distinction sake, that we might express the Latin *sub* by some of the foregoing adverbs; and the diminutive termination *usculus* by *ish*. Thus *subobtusus*, somewhat blunt; *obtusiusculus*, bluntish. Sub has also occasionally the meaning of under, as in submarine. This word is frequently used in musical treatises in conjunction with the Greek names of the intervals, as sub-diapason, sub-diapente, sub-diatessaron, &c.

SUBA'CID. *a.* (*sub* and *acidus*, Lat.) Sour in a small degree (*Arbuthnot*).

SUBA'CRID. *a.* (*sub* and *acrid.*) Sharp and pungent in a small degree (*Floyer*).

To SUBA'CT. *v. a.* (*subactus*, Latin.) To reduce; to subdue (*Bacon*).

SUBA'CTION. *s.* (*subactus*, Latin.) The act of reducing to any state (*Bacon*).

SU'BALTERN. *a.* (*subalterne*, Fr.) Inferiour; subordinate; that in different respects is both superiour and inferiour (*Swift*).

SUBALTERN, a subordinate officer, or one who discharges his post under the command and subject to the direction of another: such are lieutenants, sub-lieutenants, cornets, and ensigns, who serve under the captain; but custom has now appropriated the term to those of much lower ranks, as serjeants, &c. We also say subaltern courts, jurisdictions, &c. such are those of inferior lords, with regard to the lord paramount; hundred-courts with regard to county-courts, &c.

SUBALTE'RNATE. *a.* (*subalternus*, Lat.) Succeeding by turns.

SUBASTRI'NGENT. *a.* (*sub* and *astringent.*) Astringent in a small degree.

SUBBE'ADLE. *s.* (*sub* and *beadle.*) An under beadle (*Ayliffe*).

SUBCELE'STIAL. *a.* (*sub* and *celestial.*) Placed beneath the heavens (*Glanville*).

SUBCHA'NTER. *s.* (*sub* and *chantor*, *succentor*, Latin.) The deputy of the precentor in a cathedral.

SUBCLA'VIAN. *a.* (*sub* and *clavis*, Lat.) Under the armpit or shoulder (*Arbuthnot*).

SUBCLAVIAN ARTERY. (from *sub*, under, and *clavis*, a key, because the clavicles were supposed to resemble the key of the ancients.) The right subclavian arises from the arteria innominata, and proceeds under the clavicle to the axilla. The left subclavian arises from the arch of the aorta, and ascends under the left clavicle to the axilla. The subclavians in their course give off the internal mammary, the cervical, the vertebral, and the superior intercostal arteries.

SUBCLAVIUS. (*musculus subclavius.*) A muscle, situated on the anterior part of the thorax, which pulls the clavicle downwards and forwards. It arises tendinous from the cartilage that joins the first rib to the sternum, is inserted after becoming fleshy into the inferior part of the clavicle, which it occupies from within an inch of the sternum as far outwards as to its connexion, by a ligament, with the coracoid process of the scapula.

SUBCONSTELLA'TION. *s.* (*sub* and *constellation.*) A subordinate or secondary constellation (*Brown*).

SUBCO'NTRARY. *a.* (*sub* and *contrary.*) Contrary in an inferiour degree (*Watts*).

SUBCONTRARY POSITION, in geometry, is when two equiangular triangles AED, ABC, fig. 3, pl. 13, (see the article ANTIPARALLELS) are so placed as to have one common angle A at the vertex, and yet their bases not parallel. Consequently, the angles at the bases are equal, but on the contrary sides; viz. the $\angle E = \angle B$, and $\angle D = \angle C$.

If an oblique cone with a circular base whose diameter is CB, be so cut by a transverse plane, as to make, in the section ABC, through the vertex A, the $\angle E = \angle B$, and $\angle D = \angle C$, then the cone is said to be cut by the transverse plane in a subcontrary position to the base BC; and in this case the section whose diameter is DE is always a circle when BC is.

SUBCORDATE, in botany, somewhat heart-shaped.

SUBCUTANEOUS GLANDS. These are sebaceous glands, lying under the skin, which they perforate by their excretory ducts.

SUBDEA′CON. *s.* (*subdiaconus*, Lat.) In the Romish church, is the deacon's servant (*Ayliffe*).

SUBDE′AN. *s.* (*subdecanus*, Latin.) The vicegerent of a dean (*Ayliffe*).

SUBDECU′PLE. *a.* (*sub* and *decuplus*, Lat.) Containing one part of ten.

SUBDERISO′RIOUS. *a.* (*sub* and *derisor*, Latin.) Scoffing or ridiculing with tenderness (*More*).

SUBDITI′TIOUS. *a.* (*subdititius*, Lat.) Put secretly in the place of something else.

To SUBDIVE′RSIFY. *v. a.* (*sub* and *diversify*.) To diversify again what is already diversified (*Hale*).

To SU′BDIVIDE. *v. a.* (*sub* and *divide*.) To divide a part into yet more parts (*Roscommon*).

SUBDIVI′SION. *s.* (from *subdivide*.) 1. The act of subdividing (*Watts*). 2. The parts distinguished by a second division (*Addison*).

SU′BDOLOUS. *a.* (*subdolus*, Lat.) Cunning; subtle; sly.

SUB-DOMINANT. The name given by some musical theorists to the fourth note of any mode or key; because the dominant, or fifth, is immediately above it: or rather because it has the same interval with the tonic in descending, which the dominant has with the tonic in ascending.

To SUBDU′CE. *To* Subdu′ct. *v. a.* (*subduco*, *subductus*, Latin.) 1. To withdraw; to take away (*Milton*). 2. To subtract by arithmetical operation (*Hale*).

SUBDU′CTION. *s.* (from *subduct*.) 1. The act of taking away (*Hale*). 2. Arithmetical subtraction (*Hale*).

To SUBDU′E. *v. a.* (from *subdo*, Latin.) 1. To crush; to oppress; to sink (*Milton*). 2. To conquer; to reduce under a new dominion (*Sprat*). 3. To tame; to subact; to break (*May*).

SUBDU′EMENT. *s.* (from *subdue*.) Conquest: not used (*Shakspeare*).

SUBDU′ER. *s.* (from *subdue*.) Conqueror; tamer (*Philips*).

SUBDUPLE. See Duple.

SUBDUPLICATE. See Duplicate.

SUBER. The cork tree. The fruit of this tree, quercus suber of Linnéus, are much more nutritious than our acorns, and are sweet and often eaten when roasted in some parts of Spain. The bark called cork when burnt, is employed as an adstringent application to bleeding piles, and to allay the pain usually attendant on hæmorrhoids, when mixed with an ointment. Pessaries and other chirurgical instruments are also made of this useful bark. See Quercus.

SUBEROSE, in botany, as if a little eaten or gnawn.

SUBEXCEDENT. A very little longer.

SUBJA′CENT. *a.* (*subjacens*, Lat.) Lying under (*Woodward*).

To SUBJE′CT. *v. a.* (*subjectus*, Lat.) 1. To put under (*Pope*). 2. To reduce to submission; to make subordinate; to make submissive (*Dryden*). 3. To enslave; to make obnoxious (*Locke*). 4. To expose; to make liable (*Arbuth.*). 5. To submit; to make accountable (*Locke*). 6. To make subservient (*Milt.*).

Su′bject. *a.* (*subjectus*, Lat.) 1. Placed or situate under (*Shakspeare*). 2. Living under the dominion of another (*Locke*). 3. Exposed; liable; obnoxious (*Dryden*). 4. Being that on which any action operates, whether intellectual or material (*Dryden*).

Subject, in the manage. To keep a horse subject is an expression relating to volts, signifying to keep the croupe of the horse in the round, so that it may not slip out; that he may not traverse; and that he may work in the manage, croupe in, marking his equal times without losing his ground.

Su′bject. *s.* (*sujet*, Fr.) 1. One who lives under the dominion of another: opposed to *governour* (*Shakspeare*). 2. That on which any operation, either mental or material, is performed (*More*). 3. That in which any thing inheres or exists (*Bacon*). 4. (In grammar.) The nominative case to a verb is called by grammarians the *subject* of the verb (*Clarke*).

SUBJE′CTION. *s.* (from *subject*.) 1. The act of subduing (*Hale*). 2. The state of being under government (*Spenser*).

SUBJE′CTIVE. *a.* Relating not to the object, but the subject (*Watts*).

SUBINGRE′SSION. *s.* (*sub* and *ingressus*, Lat.) Secret entrance (*Boyle*).

To SUBJOI′N. *v. a.* (*subjungo*, Lat.) To add at the end; to add afterward (*South*).

SUBITA′NEOUS. *a.* (*subitaneus*, Latin.) Sudden; hasty.

SUBITO, in music, quickly, expeditiously. As *volti subito*, turn over quickly.

To SU′BJUGATE. *v. a.* (*subjugo*, Latin.) To conquer; to subdue; to bring under dominion by force (*Prior*).

SUBJUGA′TION. *s.* (from *subjugate*.) The act of subduing (*Hale*).

SUBJU′NCTION. *s.* (from *subjungo*, Lat.) The state of being subjoined; the act of subjoining (*Clarke*).

SUBJU′NCTIVE. *a.* (*subjunctivus*, Lat.) Subjoined to something else.

Subjunctive, in grammar, the fourth mood, or manner of conjugating verbs; thus called, because usually subjoined to some other verb, or at least to some other particle, as, *if I loved: though this were true*, &c.

The Greek is almost the only language that properly has any subjunctive mood; though the French, Spanish, and Italian, have some shew thereof. In all other languages the same inflections serve for the optative and the subjunctive moods: for which reason the subjunctive mood might be retrenched from the Latin, and those other grammars; it not being the different ways of signifying, which may be very much multiplied, but the different inflections, that constitute the different moods. See Mood.

SUBLAPSA′RIAN. Subla′psary. *a.* (*sub* and *lapsus*, Lat.) Done after the fall of man (*Hammond*).

SUBLAPSARY, or infralapsary, in theology, a term applied to such as hold that God, having foreseen and permitted the fall of Adam, and, in consequence thereof, the loss of mankind, resolved to give a grace sufficient for salvation to some, and to refuse it to others.

Sublapsarian is used as synonymous with infralapsarian, in opposition to supralapsarian.

SUBLA′TION. *s.* (*sublatio*, Lat.) The act of taking away.

SUBLEVA′TION. *s.* (*sublevo*, Lat.) The act of raising on high.

SUBLI′MABLE. *a.* (from *sublime.*) Possible to be sublimed.

SUBLI′MABLENESS. *s.* (from *sublimable.*) Quality of admitting sublimation (*Boyle*).

To SU′BLIMATE. *v. a.* (from *sublime.*) 1. To raise by the force of chemical fire. 2. To exalt; to heighten; to elevate (*D. of P.*).

Sublimate. See Hydrargyrus muriatus.

SUBLIMATION. (*sublimatio*, from *sublimo*, to raise or sublime.) In chemistry, a process that differs from evaporation only in being confined to solid substances. It is usually performed either for the purpose of purifying certain substances, and disengaging them from extraneous matters; or else to reduce into vapour, and combine, under that form, principles which would have united with greater difficulty if they had not been brought to that state of extreme division.

As all fluids are volatile by heat, and consequently capable of being separated, in most cases, from fixed matters, so various solid bodies are subjected to a similar treatment. Fluids are said to distil, and solids to sublime, though sometimes both are obtained in one and the same operation. If the subliming matter concretes into a solid, hard mass, it is commonly called a sublimate; if into a powdery form, flowers.

The principal subjects of this operation are, volatile alkaline salts; neutral salts, composed of volatile salts and acids, as sal ammoniac, the salt of amber, and flowers of benzoin, mercurial preparations, and sulphur. Bodies of themselves not volatile are frequently made to sublime by the mixture of volatile ones; thus iron is carried by sal ammoniac in the preparations of the flores martialis, or ferrum ammoniacale.

The fumes of solid bodies in close vessels rise but a little way, and adhere to that part of the vessel where they concrete. Hence a receiver or condenser is less necessary here than in the preceding operation; a single vessel, as a mattrass, or tall vial, or the like, being frequently sufficient.

SUBLI′ME. *a.* (*sublimis*, Lat.) 1. High in place; exalted aloft (*Dryden*). 2. High in excellence; exalted by nature (*Milton*). 3. High in style or sentiment; lofty; grand (*Prior*). 4. Elevated by joy (*Milton*). 5. Lofty of mien (*Wotton*).

Sublime, in discourse, something extraordinary and surprising, which strikes the soul, and makes a sentiment or composition ravish and transport.

This is what Longinus, who has written expressly on the subject, means by sublime. The definition, indeed, is not his, but M. Boileau's; for the author, writing his book after another of Cecilius on the same subject, and employing himself almost wholly in shewing what the sublime is, declined defining it, as supposing it well known.

It happens, however, that there are few subjects of discussion on which a greater variety of opinions are entertained than this, several ingenious intellectual philosophers having proposed different theories, each having in it something plausible, and, perhaps, something objectionable. In order to come to a decision on this point, the reader may peruse in succession, Burke on the Sublime and Beautiful, sir Joshua Reynolds's Discourses, Alison on Taste, and Mr. Dugald Stewart's Essays.

Sublime geometry, the higher geometry, or that which relates to the nature of lines of the third and superior orders; the tangents and asymptotes to curves; the maxima and minima of the ordinates, &c.

To Subli′me. *v. a.* (from the adjective.) 1. To raise by chemical fire (*Donne*). 2. To raise on high (*Denham*). 3. To exalt; to heighten; to improve (*Pope*).

To Subli′me. *v. n.* To rise in the chemical vessel by the force of fire (*Arbuthnot*).

SUBLI′MELY. *ad.* (from *sublime.*) Loftily; grandly (*Pope*).

SUBLIMIS. (*musculus sublimis.*) In myology. See Flexor brevis digitorum pedis, and Flexor sublimis perforatus.

SUBLI′MITY. *s.* (*sublimitas*, Latin.) 1. Height of place; local elevation. 2. Height of nature; excellence (*Raleigh*). 3. Loftiness of style or sentiment (*Addison*).

SUBLI′NGUAL. *a.* (*sub* and *lingua*, Lat.) Placed under the tongue (*Harvey*).

Sublingual glands. Glandulæ sublinguals. The glands which are situated under the tongue, and secrete saliva. Their excretory ducts are called Riverian, from their discoverer.

SUBLU′NAR. Su′blunary. *a.* (*sub* and *lunar*, Lat.) Situate beneath the moon; earthly; terrestrial (*Swift*).

SUBLUXATION. A partial luxation, in which the head of a bone is not quite out of its socket, but rests upon the brim.

SU′BMARINE. *a.* (*sub* and *mare*, Lat.) Lying or acting under the sea (*Wilkins*).

To SUBME′RGE. *v. a.* (*submergo*, Latin.) To drown; to put under water (*Shakspeare*).

SUBME′RSION. *s.* (from *submersus*, Lat.) The act of drowning; state of being drowned (*Hale*).

To SUBMI′NISTER. *To* Submi′nistrate. *v. a.* (*subministro*, Lat.) To supply; to afford (*Hale*).

To Submi′nister. *v. n.* To subserve; to be useful to (*L'Estrange*).

SUBMI′SS. *a.* (from *submissus*, Latin.) Humble; submissive; obsequious (*Milton*).

SUBMI′SSION. *s.* (from *submissus*, Lat.) 1. Delivery of himself to the power of another (*Shakspeare*). 2. Acknowledgment of inferiority or dependance (*Halifax*). 3. Acknowledgment of a fault; confession of errour (*Shakspeare*). 4. Obsequiousness; resignation (*Temple*).

SUBMI′SSIVE. *a.* (*submissus*, Lat.) Humble; testifying submission or inferiority (*Prior*).

SUBMI′SSIVELY. *ad.* Humbly; with confession of inferiority (*Pope*).

SUBMI′SSIVENESS. *s.* Humility; confession of fault or inferiority (*Herbert*).

SUBMI′SSLY. *ad.* (from *submiss*.) Humbly; with submission (*Taylor*).

To SUBMI′T. *v. a.* (*submitto*, Lat.) 1. To let down; to sink (*Dryden*). 2. To subject; to resign to authority (*Genesis*). 3. To leave to discretion; to refer to judgment (*Swift*).

To Submi′t. *v. n.* To be subject; to acquiesce in the authority of another; to yield (*Rogers*).

SUBMULTIPLE, in geometry, &c. A submultiple number, or quantity, is that which is contained a certain number of times in another, and which, therefore, repeated a certain number of times, becomes exactly equal thereto. Thus 3 is a submultiple of 21. In which sense a submultiple coincides with an aliquot part.

Submultiple ratio, is that between the quantity contained and the quantity containing. Thus the ratio of 3 to 21 is submultiple. In both cases submultiple is the reverse of multiple: 21, *e. gr.* being a multiple of 3, and the ratio of 21 to 3 a multiple ratio.

SUBNORMAL, in geometry, or subperpendicular, the distance upon the axis, between the foot of the ordinate and the perpendicular to the curve or its tangent. In all curves the subnormal is a third proportional to the subtangent and the ordinate; and in the parabola it is a constant quantity, being equal to half the parameter of the axis.

SUBNUDE, in botany. Almost naked.

SUBO′CTAVE. Subo′ctuple. *a.* (*sub* and *octavus*, Latin, and *octuple*.) Containing one part of eight (*Arbuthnot*).

SUBO′RDINACY. Subo′rdinancy. *s.* (from *subordinate*.) 1. The state of being subject (*Spectator*). 2. Series of subordination (*Temple*).

SUBO′RDINATE. *a.* (*sub* and *ordinatus*, Lat.) 1. Inferiour in order, in nature, in dignity or power (*Addison*). 2. Descending in a regular series (*Bacon*).

To Subo′rdinate. *v. a.* (*sub* and *ordino*, Lat.) To arrange one under another (*Wotton*).

SUBO′RDINATELY. *ad.* In a series regularly descending (*Decay of Piety*).

SUBORDINA′TION. *s.* (from *subordinate*.) 1. The state of being inferiour to another (*Dryden*). 2. A series regularly descending (*Holyday*). 3. Place of rank (*Swift*).

To SUBO′RN. *v. a.* (*suborner*, Fr. *suborno*, Latin.) 1. To procure privately; to procure by secret collusion (*Prior*). 2. To procure by indirect means (*Dryden*).

SUBORNATION, in law, a secret, underhand, preparing, instructing, or bringing in a false witness; and from hence subornation of perjury is the preparing or corrupt alluring to perjury. The punishment for this crime was formerly death, then banishment or cutting out the tongue, afterwards forfeiture of goods; and it is now a fine and imprisonment, and never more to be received as evidence. The statute 2 Geo. II. c. 25. superadded a power for the court to order the offender to be sent to the house of correction for a term not exceeding seven years, or be transported for the same period.

SUBORNER, one that procures a bad action to be done.

SUBOVATE, almost or nearly ovate.

SUBPETIOLATE, in botany, scarcely petioled, or, with a very short petiole.

SUBPŒNA, in law, a writ whereby common persons are called into chancery, in such cases where the common law hath provided no ordinary remedy; and the name of it proceeds from the words therein, which charge the party called to appear at the day and place assigned *sub pœna centum librarum*, &c. The subpœna is the leading process in the courts of equity; and by statute, when a bill is filed against any person, process of subpœna shall be taken out to oblige the defendant to appear and answer the bill, &c.

Subpœna ad testificandum, a writ or process to bring in witnesses to give their testimony. If a witness on being served with this process does not appear, the court will issue an attachment against him; or a party, plaintiff or defendant, injured by his non-attendance, may maintain an action against the witness. See Blackst. Com. vol. iii. p. 369.

Subpœna, in equity, a process in equity, calling on a defendant to appear and answer to the complainant's bill. See stat. 5 Geo. II. c. 25. which enacts, that where the party cannot be found to be served with a subpœna, and absconds (as believed) to avoid being served, a day shall be appointed him to appear to the bill of the plaintiff; which is to be inserted in the London Gazette, read in the parish-church where the defendant last lived, and fixed up at the Royal Exchange: and if the defendant doth not appear that day, the bill shall be taken *pro confesso*.

SUBQUA′DRUPLE. *a.* (*sub* and *quadruple*.) Containing one part of four (*Wilkins*).

SUBQUI′NTUPLE. *a.* (*sub* and *quintuple.*) Containing one part of five (*Wilkins*).

SUBRE′CTOR. *s.* (*sub* and *rector.*) The rector's vicegerent (*Walton*).

SUBRE′PTION. *s.* (*subreptus*, Lat.) The act of obtaining a favour by surprise or unfair representation.

SUBREPTI′TIOUS. *a.* (*surreptitius*, Lat.) Fraudulently obtained from a superiour (*Bai.*).

SUBROGATION, or SURROGATION, in the civil law, the act of substituting a person in the place, and intitling him to the rights, of another. In its general sense, subrogation implies a succession of any kind, whether of a person to a person, or of a person to a thing. There are two kinds of subrogation: the one conventional, the other legal. Conventional subrogation is a contract whereby a creditor transfers his debt, with all appurtenances thereof, to the profit of a third person. Legal subrogation is that which the law makes in favour of a person who discharges an antecedent creditor; in which case there is a legal translation of all rights of the ancient creditor to the person of the new one.

SUBSCAPULARIS. (*musculus subscapularis*, from *sub*, under, and *scapula*, the shoulder-blade.) The name of this muscle sufficiently indicates its situation. It is composed of many fasciculi of tendinous and fleshy fibres, the marks of which we see imprinted on the under surface of the scapula. These fasciculi, which arise from all the basis of that bone internally, and likewise from its superior, as well as from one half of its inferior costa, unite to form a considerable flat tendon which adheres to the capsular ligament, and is inserted into the upper part of the lesser tuberosity at the head of the os humeri.

The principal use of this muscle is to roll the arm inwards. It likewise serves to bring it close to the ribs; and, from its adhesion to the capsular ligament, it prevents that membrane from being pinched.

To SUBSCRI′BE. *v. a.* (*subscribo*, Latin.) 1. To give consent to, by underwriting the name (*Clarendon*). 2. To attest by writing the name (*Whitgift*). 3. To submit: not used (*Shakspeare*).

To SUBSCRI′BE. *v. n.* 1. To give consent (*Milton*). 2. To promise a stipulated sum for the promotion of any undertaking.

SUBSCRI′BER. *s.* (from *subscriptio*, Lat.) 1. One who subscribes. 2. One who contributes to any undertaking (*Swift*).

SUBSCRI′PTION. *s.* (from *subscriptio*, Lat.) 1. Any thing underwritten (*Bacon*). 2. Consent or attestation given by underwriting the name. 3. The act or state of contributing to any undertaking (*Pope*). 4. Submission; obedience: not in use (*Shakspeare*).

SUBSCRIPTION, in general, signifies the signature put at the bottom of a letter, writing, or instrument. In commerce, it is used for the share or interest which particular persons take in a public stock or a trading company, by writing their names, and the shares they require, in the books or register thereof.

Subscription to articles of faith is required of the clergy of most established churches, and of some churches not established. Whether such subscription serves any good purpose, in a religious or theological view, is a very doubtful question. At all events, universal experience proves that it does not ensure uniformity of sentiment. See ARTICLES.

SUBSE′CTION. *s.* (*sub* and *sectio*, Latin.) A subdivision of a larger section into a lesser; section of a section.

SUBSE′CUTIVE. *a.* (from *subsequor*, Lat.) Following in a train.

SUBSEPTU′PLE. *a.* (*sub* and *septuplus*, Lat.) Containing one of seven parts (*Wilkins*).

SU′BSEQUENCE. *s.* (from *subsequor*, Lat.) The state of following; not precedence (*Grew*).

SU′BSEQUENT. *a.* (*subsequens*, Latin.) Following in train; not preceding (*Prior*).

SU′BSEQUENTLY. *ad.* Not so as to go before; so as to follow in train (*South*).

To SUBSE′RVE. *v. a.* (*subservio*, Lat.) To serve in subornation; to serve instrumentally (*Walsh*).

SUBSE′RVIENCE. SUBSE′RVIENCY. *s.* (from *subserve.*) Instrumental fitness, use, or operation (*Bentley*).

SUBSE′RVIENT. *a.* (*subserviens*, Latin.) Ministerial; instrumentally useful (*Newton*).

SUBSE′XTUPLE. *a.* (*sub* and *sextuplus*, Lat.) Containing one part of six (*Wilkins*).

To SUBSI′DE. *v. n.* (*subsido*, Latin.) To sink; to tend downward (*Dryden*).

SUBSI′DENCE. SUBSI′DENCY. *s.* (from *subside.*) The act of sinking; tendency downward (*Arbuthnot*).

SUBSI′DIARY. *a.* (*subsidiarius*, Latin.) Assistant; brought in aid (*Arbuthnot*).

SU′BSIDY. *s.* (*subsidium*, Lat.) Aid, commonly such as is given in money (*Addison*).

SUBSIDY, in law, signifies an aid or tax granted to the king by parliament for the necessary occasions of the kingdom; and is to be levied on every subject of ability, according to the rate or value of his lands or goods: but this word, in some of our statutes, is confounded with that of customs. See TAX.

To SUBSI′GN. *v. a.* (*subsigno*, Lat.) To sign under (*Camden*).

To SUBSI′ST. *v. n.* (*subsisto*, Lat.) 1. To be; to have existence. 2. To continue; to retain the present state or condition (*Swift*). 3. To have means of living; to be maintained (*Atterbury*). 4. To inhere; to have existence by means of something else (*South*).

SUBSI′STENCE, or SUBSISTENCY. *s.* (from *subsist.*) 1. Real being (*Stillingfleet*). 2. Competence; means of supporting life (*Addison*). 3. Inherence in something else.

SUBSISTENCE, in the military art, is the money paid to the soldiers weekly, not amounting to their full pay, because their clothes, accoutrements, tents, &c. have yet to be paid: it is likewise the money paid the officers upon accompt, till their accompts be made up, and then they are paid their arrears.

SUBSI′STENT. *a.* (*subsistens*, Latin.) 1.

Having real being (*Brown*). 2. Inherent (*Bentley*).

SU'BSTANCE. *s.* (*substantia*, Latin.) 1. Being; something existing; something of which we can say that it is (*Davies*). 2. That which supports accidents (*Watts*). 3. The essential part (*Addison*). 4. Something real, not imaginary; something solid, not empty (*Dryden*). 4. Body; corporeal nature (*Newton*). 6. Wealth; means of life (*Swift*).

Substance, (*substantia*), something that we conceive to subsist of itself, *sub se stans*, independently of any created being, or any particular mode or accident.

Thus a piece of wax is a substance; because we can conceive it as subsisting of itself, and of its own nature, without any dependence on any other created nature, or without any particular mode, form, colour, &c. See Mode.

It is a being, however, which is the subject of modes or accidents. Of substances, some are thinking or conscious beings, and others are extended and solid, or impenetrable. Of the former class is the human soul, and of the latter philosophers consider matter only. If we seclude space out of our consideration, there will remain but these two sorts of substances, viz. matter and mind, or body and spirit; at least we have no ideas of any other substance than these. See Watts' Logic, cap. ii. sect. 2. and Phil. Essays, ess. ii.

Spinosa maintains, that there is but one substance in nature, whereof all created things are so many different modifications; and thus he makes the soul of the same substance with the body. The whole universe, according to him, is but one substance; which substance he holds endowed with an infinity of attributes, in the number of which are thinking and extension. All bodies are modifications of this substance, considered as extended; and all spirits modifications of the same substance, considered as thinking. See Spinozism. See also Matter and Soul.

Mr. Locke's philosophy of substances is more just; our ideas of substances, that great author observes, are only such a combination of simple ideas as is taken to represent distinct things, subsisting by themselves; in which the confused idea of substance is always the chief. Thus the combination of the ideas of a certain figure, with the powers of motion, thought and reasoning, joined to substance, make the ordinary idea of man: and thus the mind observing several simple ideas to go constantly together, which being presumed to belong to one thing, or to be united in one subject, are called by one name, which we are apt, afterwards, to talk of, and consider as one simple idea.

We imagine these simple ideas do not subsist by themselves; but suppose some substratum, wherein they subsist, which we call substance.

The idea of pure substances is nothing but the supposed, yet unknown, support of those qualities which are capable of producing simple ideas in us.

The ideas of particular substances are composed out of this obscure and general idea of substance, together with such combinations of simple ideas as are observed to exist together, and are supposed to flow from the internal constitution, and unknown essence of that substance.

Thus we come by the ideas of man, horse, gold, &c. Thus the sensible qualities of iron, or a diamond, make the complex idea of those substances, which a smith, or a jeweller, commonly knows better than a philosopher.

The same happens concerning the operations of the mind, viz. thinking, reasoning, &c. which we, concluding not to subsist by themselves, nor apprehending how they can belong to body, or be produced by it, think them the actions of some other substance, which we call spirit; of whose substance or nature we have as clear a notion as that of body; the one being the supposed substratum of the simple ideas we have from without, as the other of those operations, which we experience in ourselves within; so that the idea of corporeal substance in matter is as remote from our conceptions as that of spiritual substance.

Hence we may conclude, that he has the most perfect idea of any particular substance, who has collected most of those simple ideas which exist in it; among which we are to reckon its active powers, and passive capacities, though not strictly simple ideas.

Substances are generally distinguished by secondary qualities; for our senses fail us in the discovery of primary ones, as the bulk, figure, texture, &c. of the minute parts of bodies, on which their real constitutions and differences depend. And secondary qualities are nothing but powers with relation to our senses.

The ideas that make our complex ones of corporeal substances, are of three sorts: first, The ideas of primary qualities of things which are discovered by our senses; such as bulk, figure, motion, &c. Secondly, The sensible secondary qualities, which are nothing but powers to produce several ideas in us by our senses. Thirdly, The aptness we consider in any substance, to cause or receive such alterations in its primary qualities, as that the substance, so altered, should produce in us different ideas from what it did before.

Besides the complex ideas we have of material substances, by the simple ideas taken from the operations of our own minds, which we experience in ourselves, as thinking, understanding, willing, knowing, &c. co-existing in the same substance, we are able to frame the complex idea of a spirit; and this idea of an immaterial substance is as clear as that we have of a material one.

By joining these with substance, of which we have no distinct idea, we have the idea of spirit; and by putting together the ideas of coherent solid parts, and a power of being moved, joined with substance, of which, likewise, we have no positive idea, we have the idea of matter.

Farther, there are other ideas of substances, which may be called collective, which are made up of any particular substances, considered as united into one idea; as a troop, army, &c. which the mind does by its power of composition. These collective ideas are but the artificial draughts of the mind, bringing things remote and independent into one view, the better to contemplate the discourse of them united into one conception, and signified by one name. For there are no things so remote which the mind cannot, by this art of composition, bring into one idea, as is visible in that signified by the name *universe*.

SUBSTANTIA, in botany. The substance of a vegetable consists of the epidermis or cuticle, covering the cortex or outer bark, formed on its inner surface from the liber or inner bark, the interior tunic of which changes gradually into hard rings of wood, clothing the medulla or pith.—Or, taking it the other way, it is the medulla or pith clothed by the wood, which is formed from the liber, separating from the cortex, and covered by the epidermis.

SUBSTA′NTIAL. *a.* (from *substance.*) 1. Real; actually existing (*Bentley*). 2. True; solid; real; not merely seeming (*Denham*). 3. Corporeal; material (*Watts*). 4. Strong; stout; bulky (*Milton*). 5. Responsible; moderately wealthy; possessed of substance (*Addison*).

SUBSTANTIA′LITY. *s.* (from *substantial.*) 1. The state of real existence. 2. Corporeity; materiality (*Glanville*).

SUBSTA′NTIALLY, *ad.* (from *substantial.*) 1. In manner of a substance; with reality of existence (*Milton*). 2. Strongly; solidly (*Clarendon*). 3. Truly; really; with fixed purpose (*Tillotson*). 4. With competent wealth.

SUBSTA′NTIALNESS. *s.* (from *substantial.*) 1. The state of being substantial. 2. Firmness; strength; power of holding or lasting (*Wotton*).

SUBSTA′NTIALS. *s.* (without singular.) Essential parts (*Ayliffe*).

To SUBSTA′NTIATE. *v. a.* (from *substance.*) To make to exist (*Ayliffe*).

SU′BSTANTIVE. *s.* (*substantivum*, Lat.) A noun betokening the thing, not a quality. See GRAMMAR.

SUBSTA′NTIVE. *a.* (*substantivus*, Latin.) 1. Solid; depending only on itself (*Bacon*). 2. Betokening existence (*Arbuthnot*).

To SU′BSTITUTE. *v. a.* (*substitutus*, Lat.) To put in the place of another (*Dryden*).

SU′BSTITUTE. *s.* (from the verb.) 1. One placed by another to act with delegated power (*Addison*). 2. It is used likewise of things: as, one medicine is a *substitute* for another.

SUBSTITU′TION. *s.* (from *substitute.*) The act of placing any person or thing in the room of another (*Bacon*).

SUBSTITUTION, in algebra, is the putting and using, in an equation, one quantity instead of another which is equal to it, but expressed after another manner. See ALGEBRA.

To SUBSTRA′CT. *v. a.* (*soustraction*, Fr.) 1. To take away part from the whole. 2. To take one number from another.

SUBSTRA′CTION. *s.* (*soustraction*, Fr.) 1. The act of taking away part from the whole (*Denham*). 2. The taking of a lesser number out of a greater of like kind, whereby to find out a third number.

The greater number or quantity is called the *minuend*, the less the *subtrahend*, and the difference between them is called the *remainder*. See ARITHMETIC and ALGEBRA.

SUBSTRU′CTION. *s.* (*substuctio*, Lat.) Underbuilding (*Wotton*).

SUBSTY′LAR. *a.* (*sub* and *stylus*, Lat.) *Substylar* line is, in dialling, a right line, whereon the gnomon or style of a dial is erected at right angles with the plane.

SUBSU′LTIVE. SUBSU′LTORY. *a.* (*subsultus*, Lat.) Bounding; moving by starts.

SUBSU′LTORILY. *ad.* (from *subsultory.*) In a bounding manner; by starts (*Bacon*).

SUBSULTUS TENDINUM. (from *subsulto*, to leap.) Weak convulsive motions or twitchings of the tendons, mostly of the hands, generally observed in the extreme stages of putrid fever.

SUBTANGENT OF A CURVE, the line that determines the intersection of a tangent with the axis; or that determines the point wherein the tangent cuts the axis prolonged.

The tangent, subtangent, and semiordinate, always make a right-angled triangle.

It is a rule in all equations, that if the value of the subtangent comes out positive, the point of intersection of the tangent and axis falls on that side of the ordinate, where the vertex of the curve lies, as in the parabola and paraboloids.

If it come out negative, the point of intersection will fall on the contrary side of the ordinate, in respect of the vertex or beginning of the absciss; as in the hyperbola and hyperboliform figures.

And universally, in all paraboliform and hyperboliform figures, the subtangent is equal to the exponent of the power of the ordinate, multiplied into the absciss: thus, in the common parabola, whose property is $px=yy$; the subtangent is in length equal to x, the absciss multiplied by 2, the exponent of the power of yy, the square of the ordinate; that is, it is equal to twice the absciss; and by the former rule for paraboliform figures, it must be taken above the ordinate in the axis produced.

Thus, also, in one of the cubical paraboloids, where $pxx=yyy$; the length of the subtangent will be $\frac{3}{2}$ of the absciss: and in a parabola of any kind, the general equation being $a^m x^n = + y^{m+n}$, the subtangent is $= \dfrac{m+n}{n} \times x$, or its ratio to the absciss is constantly that of $m+n$ to n. See *Method of* TANGENTS.

In the parabola, the subtangent is double the absciss; and in the logarithmic curve the subtangent is also a constant quantity, being equal to the modulus of the system of logarithms which the curve represents. See LOGARITHMIC.

To SUBTE′ND. *v. a.* (*sub* and *tendo*, Lat.) To be extended under (*Creech*).

SUBTENSE, formed from *sub*, under, and *tendo*, I stretch, in geometry, a right line opposite to an angle, and presumed to be drawn between the two extremities of the arch which measures that angle.

The subtense of the angle coincides with the chord of the arch.

In every right-angled triangle, the square of the subtense of the right angle is equal to the squares of the subtenses of both the other angles, by the 47th prop. of Euclid. See HYPOTHENUSE and TRIANGLE.

SU′BTER. (Lat.) In composition, signifies *under*.

SUBTERFLU′ENT. SUBTE′RFLUOUS. *a.* (*subterfluo*, Lat.) Running under.

SU′BTERFUGE. *s.* (*subterfuge*, Fr.) A shift; an evasion; a trick (*Glanville*).

SUBTERRA′NEAL. SUBTERRA′NEAN. SUBTERRA′NEOUS. SU′BTERRANY. *a.* (*sub* and *terra*, Lat.) *Subterranean* or *subterraneous*, is the word now used. Lying under the earth; placed below the surface (*Milton. Norris*).

SUBTERRA′NITY. *s.* (*sub* and *terra*, Latin.) A place under ground: not in use.

SU′BTILE. *a.* (*subtilis*, Latin.) 1. Thin; not dense; not gross (*Newton*). 2. Nice; fine; delicate; not coarse (*Davies*). 3. Piercing; acute (*Prior*). 4. Cunning; artful; sly; subdolous: now commonly written *subtle* (*Milton*). 5. Deceitful (*Shakspeare*). 6. Refined; acute beyond necessity (*Milton*).

SU′BTILELY. *ad.* (from *subtile*.) 1. In a subtile manner; thinly. 2. Finely; not grossly (*Bacon*). 3. Artfully; cunningly (*Tillotson*).

SU′BTILENESS. *s.* (from *subtile*.) 1. Fineness; rareness. 2. Cunning; artfulness.

To SUBTI′LIATE. *v. a.* (from *subtile*.) To make thin (*Harvey*).

SUBTILIA′TION. *s.* (*subtiliation*, Fr.) The act of making thin (*Boyle*).

SUBTILIZA′TION. *s.* (from *subtilize*.) 1. *Subtilization* is making any thing so volatile as to rise readily in steam or vapour (*Quincy*). 2. Refinement; superfluous acuteness.

To SU′BTILIZE. *v. a.* (*subtilizer*, Fr.) 1. To make thin; to make less gross or coarse (*Ray*). 2. To refine; to spin into useless niceties (*Glanville*).

To SU′BTILIZE. *v. n.* To talk with too much refinement (*Digby*).

SU′BTILTY. *s.* (*subtilité*, Fr. from *subtile*.) 1. Thinness; fineness; exility of parts (*Davies*). 2. Nicety; exility (*Bacon*). 3. Refinement; too much acuteness (*Boyle*). 4. Cunning; artifice; slyness (*K. Charles*).

SU′BTLE. *a.* (written often for *subtile*, especially in the sense of cunning.) Sly; artful; cunning (*Sprat*).

SU′BTLY. *ad.* (from *subtle*.) 1. Slily; artfully; cunningly (*Milton*). 2. Nicely; delicately (*Pope*).

To SUBTRA′CT. *v. a.* (*subtractio*, Latin.) To withdraw part from the rest (*Hale*).

SUBTRA′CTER. *s.* (*subtraho*, Lat.) The number to be taken out of a larger number.

SUBTRA′CTION. *s.* See SUBSTRACTION.

SUBTRAHEND. See SUBSTRACTION.

SUBTRI′PLE. *a.* (*sub* and *triplus*, Latin.) Containing a third or one part of three (*Wilkins*).

SUBVENTA′NEOUS. *a.* (*subventaneus*, Lat.) Addle; windy (*Brown*).

To SUBVE′RSE. *v. a.* (*subversus*, Latin.) To subvert; to overthrow (*Thomson*).

SUBVE′RSION. *s.* (*subversion*, Fr. *subversus*, Latin.) Overthrow; ruin; destruction (*King Charles*).

SUBVE′RSIVE. *a.* (from *subvert*.) Having tendency to overturn (*Rogers*).

To SUBVE′RT. *v. a.* (*subverto*, Lat.) 1. To overthrow; to overturn; to destroy; to turn upside down (*Milton*). 2. To corrupt; to confound (2 *Timothy*).

SUBVE′RTER. *s.* (from *subvert*.) Overthrower; destroyer (*Dryden*).

SUBULARIA. Awl-wort. In botany, a genus of the class tetradynamia, order siliculosa. Silicle entire, ovate, with ovate concave valves contrary to the partition; style shorter than the silicle. Two species, subularia aquatica, a stemless plant with subulate leaves, found in the lakes of our own country, but more generally in those of the Alps: and subularia alpina, with a branched stem, obovate leaves, and white racemed flowers; a native of Carniola.

SUBULATE. (*subula*, an awl.) In natural history. Awl-shaped. Folium subulatum. A subulate leaf. Inferius lineare, at versus apicem attenuatum. Linear at bottom, but gradually tapering towards the end. As in arenaria saxatilis, sedum rupestre.—Applied also to the filament, in the class didynamia, &c.—to the scales of the calyx, in dianthus chinensis—to the stipule, anther, style, and receptacle.

SUBUNIFLOROUS, in botany, having one or two flowers only, or most commonly one—one or thereabouts.

SU′BURB. *s.* (*suburbium*, Lat.) 1. Building without the walls of a city (*Shakspeare*). 2. The confines; the outpart (*Cleaveland*).

SUBU′RBAN. *a.* (*suburbanus*, Lat.) Inhabiting the suburb (*Dryden*).

SUBWO′RKER. *s.* (*sub* and *worker*.) Underworker; subordinate helper (*South*).

SUCCA′GO. (from *succus*, juice.) The rob or inspissated juice of any fruit or other vegetable organ.

SUCCEDA′NEOUS. *a.* (*succedaneus*, Lat.) Supplying the place of something else (*Boyle*).

SUCCEDA′NEUM. *s.* (Lat.) That which is put to serve for something else.

To SU′CCEED. *v. n.* (*succeder*, Fr. *succedo*, Lat.) 1. To follow in order (*Milton*). 2. To come into the place of one who has quitted or died (*Digby*). 3. To obtain one's wish; to terminate an undertaking in the desired effect (*Dryden*). 4. To terminate according to wish;

to have a good effect (*Tobit*). 5. To go under cover (*Dryden*).

To SU′CCEED. *v. a.* 1. To follow; to be subsequent or consequent to (*Brown*). 2. To prosper; to make successful (*Dryden*).

SUCCE′EDER. *s.* (from *succeed.*) One who follows; one who comes into the place of another (*Suckling*).

SU′CCESS. *s.* (*succès*, Fr. *successus*, Lat.) 1. The termination of any affair happy or unhappy (*Milton*). 2. Succession: obsolete (*Spenser*).

SUCCESS BAY, a bay of Tierra del Fuego. The S. promontory, at its entrance, called Cape Success, is in lon. 65. 27 W. Lat. 55. 1 S.

SUCCE′SSFUL. *a.* (*success* and *full.*) Prosperous; happy; fortunate (*Prior*).

SUCCE′SSFULLY. *ad.* Prosperously; luckily; fortunately (*Atterbury*).

SUCCE′SSFULNESS. *s.* (from *successful.*) Happy conclusion; desired event; series of good fortune (*Hammond*).

SUCCE′SSION. *s.* (*successio*, Lat.) 1. Consecution; series of one thing or person following another (*Pope*). 2. A series of things or persons following one another (*Newton*). 3. A lineage; an order of descendants (*Shakspeare*). 4. The power or right of coming to the inheritance of ancestors (*Dryden*).

SUCCE′SSIVE. *a.* (*successif*, Fr.) 1. Following in order; continuing a course or consecution uninterrupted (*Daniel*). 2. Inherited by succession: not in use (*Shakspeare*).

SUCCE′SSIVELY. *ad.* In uninterrupted order; one after another (*Newton*).

SUCCE′SSIVENESS. *s.* (from *successive.*) The state of being successive (*Hale*).

SUCCE′SSLESS. *a.* (from *success.*) Unlucky; unfortunate; failing of the event desired (*Dryden*).

SU′CCESSOR. *s.* (*successeur*, Fr. *successor*, Latin. This has sometimes the accent in the middle.) One that follows in the place or character of another; correlative to *predecessor* (*Dryden*).

SUCCINAS AMMONIACÆ. See SPIRITUS AMMONIÆ SUCCINATUS.

SUCCINATS. Salts formed by the combination of the acid of amber, or succinic acid, with different bases; as, succinate of potash, succinate of copper, &c.

SUCCI′NCT. *a.* (*succinctus*, Latin.) 1. Tucked or girded up; having the clothes drawn up (*Pope*). 2. Short; concise; brief (*Roscommon*).

SUCCI′NCTLY. *ad.* Briefly; concisely; without superfluity of diction (*Boyle*).

SUCCI′NCTNESS. *s.* (from *succinct.*) Brevity; conciseness.

SUCCINIC ACID. Acidum succinicum. Sal succini. The succinic acid is drawn from amber by sublimation in a gentle heat, and rises in a concrete form into the neck of the subliming vessel. The operation must not be pushed too far, nor by too strong a fire, otherwise the oil of amber rises along with the acid.

The acid arises partly in the form of spicular crystals, which attach themselves to the neck of the retort, and partly dissolved in the volatile oil, which ascends at the same time. In this state the acid is of a dark yellowish-brown colour, from being contaminated with the oil, and requires successive rectification before it can be obtained tolerably pure. Two methods of purifying the acid have been practised: the first is to mix the brown concrete acid with sand, or, still better, with dry unburnt white clay, free from calcareous earth, and proceed to sublimation by a very gentle heat; the clay detains the most part of the oil, and the acid rises to the upper part of the vessel, where it forms light, brown needle-shaped crystals. The second, and more economical way, recommended by Pott, is first to wash the oil in warm water, in order to separate the acid held by it in solution; then, after pouring off the oil, to add the solid acid, and heat the water till the whole of it is dissolved: a filter of cotton wool moistened with oil of amber being now prepared, the hot solution is run through it; the oil is principally detained by the filter, and the fluid, as it cools, deposits long slender crystals of succinic acid, which may be rendered still purer by subsequent solution and filtration, or still more effectually, according to Lowitz, by the following method: make a saturated solution of the solid acid in hot water, but add a quantity of finely pulverized fresh burnt charcoal, equal to half the weight of the acid; strain the solution through a filter of charcoal powder, and as the liquor cools the acid will be deposited in long, clear, perfectly colourless crystals.

According to the German chemists, the proportion of acid yielded by amber is about one thirtieth of its weight: the French, on the other hand, have not in general been able to obtain more than half this proportion. Purified succinic acid is extremely sour to the taste, though not corrosive; in very cold water it is scarcely at all soluble, requiring from 24 to 30 times its weight of this fluid at 50° Fahrenheit for its solution; of boiling water, however, three parts are sufficient. The form of its crystals is that of truncated three-sided, or when prepared after Lowitz's manner, four and six-sided prisms. When this salt is distilled in a retort, the succinic acid is completely decomposed. There pass over into the receiver an acid liquor, which is the acetic much diluted, and a quantity of brown oil. At the same time carbonic acid gass, and carbureted hydrogen gass, are disengaged, and there remain in the retort soda and charcoal. Hence it follows that this acid, like the others of the same class, is decomposed by heat, and that it is composed of oxygen, hydrogen, and carbon.

The affinities of succinic acid, according to Morveau, are as follows:

Barytes,
Lime,
Potass,
Soda,
Ammonia,

Magnesia,
Alumina,
Metallic oxydes.

SUCCINUM CINEREUM. The ambergris is so called by some authors. See Ambergrisea.

Succinum griseum. The ambergris is sometimes so called. See Ambergrisea.

Succinum preparatum. Prepared amber. See Amber.

Succinum oleum. See Oleum.

SUCCORY, in botany. See Cichorium.

To SU'CCOUR. *v. a.* (*succurro*, Lat.) To help; to assist in difficulty or distress; to relieve (*L'Estrange*).

Su'ccour. *s.* (from the verb.) 1. Aid; assistance; relief of any kind; help in distress (*Shakspeare*). 2. The person or thing that brings help (*Dryden*).

SU'CCOURER. *s.* (from *succour*.) Helper; assistant; reliever (*Romans*).

SU'CCOURLESS. *a.* (from *succour*.) Wanting relief; void of friends or help (*Thomson*).

SU'CCULENCE. Su'cculency. *s.* (from *succulent*.) Juiciness.

SU'CCULENT. *a.* (*succulent*, Fr. *succulentus*, Lat.) Juicy; moist (*Philips*).

Succulent leaf. In botany. Succulentum folium. Full of juice; in opposition to exsuccous, juiceless or dry. Applied also to the drupe, as in the plum or peach; opposed to dry, as in the almond.

SUCCULENTÆ. (*succus*, juice.) The name of the forty-sixth order in Linnéus's Fragments, and of the thirteenth in his Natural Orders.

To SUCCUMB. *v. a.* (*succumbo*, Lat.) To yield; to sink under difficulty (*Hudibras*).

SUCCUS, in pharmacy, the inspissated juice of a medical material: affording to the practitioner a convenient form for the exhibition of substances which are sufficiently succulent to afford a juice by expression, and whose virtues do not reside in any very volatile matter. The old term applied to this form was *rob*, from an Arabic root implying inspissation. In the older pharmacopœias it is a form of more frequent occurrence than in those of modern date. It is nevertheless to be found both in the Edinburgh and Dublin dispensaries; but is banished from the new pharmacopœia of the London college.

The substances most commonly employed in this shape are the following:

S. acaciæ veræ. See Acacia vera.

S. aconiti spissatus. See Aconitum.

S. baccæ sambuci spissatus. An aperient and deobstruent extract, often employed diluted with water in the cure of catarrhal affections.

S. belladonnæ spissatus. See Belladonna.

S. cicutæ spissatus. Extractium cicutæ. See Cicuta.

S. cochleariæ compositus. A warm aperient and diuretic, mostly exhibited in the cure of diseases of the skin arising from scurvy.

S. gastricus. See Gastric juice.

S. heliotropii. See Bezetta cærulia.

S. hyosciamus spissatus. See Hyosciamus.

S. lactucæ virosæ spissatus. See Lactuca graveolens.

S. limonis spissatus. See Limon.

SUCCUSSA'TION. *s.* (*succusso*, Lat.) A trot (*Brown*).

SUCCU'SSION. *s.* (*succussio*, Lat.) 1. The act of shaking. 2. (In physic.) Such a shaking of the nervous parts as is procured by strong stimuli (*Mart. Scriblerus*).

SUCH. *pronoun.* (*sulk*, Dutch; ꞅƿılc, Sax.) 1. Of that kind; of the like kind: *barbarians are cruel;* such *were the Triballi* (*Pope*). 2. The same that (*Knolles*). 3. Comprehended under the term premised: *thou art yet honest, continue* such (*South*). 4. A manner of expressing a particular person or thing: *we looked for* such *and* such *conveniencies* (*Clarendon.*)

To SUCK. *v. a.* (ꞅucan, Sax. *sugo*, *sactum*, Lat. *succer*, Fr.) 1. To draw by making a rarefaction of the air. 2. To draw in with the mouth (*Dryden*). 3. To draw the teat of a female (*Locke*). 4. To draw with the milk (*Shakspeare*). 5. To empty by sucking (*Dryden*). 6. To draw or drain (*Burnet*).

To Suck. *v. n.* 1. To draw by rarefying the air (*Mortimer*). 2. To draw the breast (*Ray*). 3. To draw; to imbibe (*Bacon*).

Suck. *s.* (from the verb). 1. The act of sucking (*Boyle*). 2. Milk given by females (*Dryden*).

SU'CKER *s.* (*suceur*, Fr. from *suck*.) 1. Any thing that draws. 2. The embolus of a pump (*Boyle*). 3. A round piece of leather, laid wet on a stone, and drawn up in the middle, rarefies the air within, which pressing upon its edges, hold it down to the stone (*Grew*). 4. A pipe through which any thing is sucked (*Philips*).

Sucker, in botany. Stolo. A shoot from the root of a vegetable, by which it may be propagated: as in violet, ranunculus repens, and most shrubs. See Runner and Sarmentosus.

Sucker, in ichthyology. See Cyclopterus.

SU'CKET. *s.* (from *suck*.) A sweetmeat, to be dissolved in the mouth (*Cleaveland*).

SU'CKINGBOTTLE. *s.* (*suck* and *bottle*.) A bottle which to children supplies the want of a pap (*Locke*).

SUCKING-FISH, in ichthyology. See Echineis.

To SU'CKLE. *v. a.* (from *suck*.) To nurse at the breast (*Dryden*).

SU'CKLING. *s.* (from *suck*.) A young creature yet fed by the pap (*Arbuthnot*).

Suckling (Sir John), a poet, born at Witham, Essex, 1613. He could speak Latin at five, and write it at nine. In his travels he studied the manners and character of foreign nations, without imitating their vices. He attended one of the campaigns of Gustavus Adolphus, and was present at three battles and five sieges, and on his return, as a proof of his patriotism, he raised at his own expence of above 12,000*l.* a troop of horse, for the king's service. This troop was more remarkable for finery than valor, so that he took much to heart their ill conduct against the Scots, and fell a victim to a fever in his 28th year, 1641. He wrote besides, a few poems, and some letters—an account of religion by reason, &c.

SU'CTION. *s.* (from *suck*; *succion*, Fr.) The art of sucking (*Boyle*).

SUDAMINA. (from *sudor*, sweat.) Hidroa. Boa. Vesicles resembling millet-seeds in form and magnitude, which appear suddenly, without fever, especially in the summer-time after much labour and sweating.

SUDATIO. (from *sudor*, sweat.) A sweating. See Ephidrosis.

SU'DATORY. *s.* (*sudo*, Latin.) Hot or sweating room, or a sweating bath.

SUDBURY, a borough in Suffolk, with a market on Saturday. It has three churches, is governed by a mayor, and sends two members to parliament. It was one of the first seats of the Flemings, who were brought over by Edward III. to teach the English the art of manufacturing their own wool. Its trade is now diverted, in great part, into other channels; but many kinds of thin stuffs are still made here, and of late silks of various kinds. It is seated on the Stour (which is navigable hence to Manningtree) 14 miles S.E. of Bury St. Edmund's, and 56 N.E. of London. Lon. 0. 50 E. Lat. 52. 11 N.

SU'DDEN. *a.* (*soudain*, Fr. ꞃoꝺen, Sax.) 1. Happening without previous notice; coming without the common preparatives; coming unexpectedly (*Milton*). 2. Hasty; violent; rash; passionate; precipitate: not in use (*Shakspeare*).

Su'dden. *s.* 1. Any unexpected occurrence; surprise: not in use (*Wotton*) 2. *On* or *of a* Sudden. Sooner than was expected (*Baker*).

SU'DDENLY. *ad.* (from *sudden.*) 1. In an unexpected manner; without preparation; hastily (*Dryden*). 2. Without premeditation (*Shakspeare*).

SU'DDENNESS. *s.* State of being sudden; unexpected presence; manner of coming or happening unexpectedly (*Temple*).

SUDERHAMN, a town of Sweden, in the province of Helsingland. It has a considerable trade in linen, butter, timber, and flax. It is situate at the mouth of a river, near the gulf of Bothnia, 20 miles N. of Gefle. Lon. 17. 5 E. Lat. 63. 20 N.

SUDERKOPING, a town of Sweden, in E. Gothland, 10 miles S. of Nordkoping, and 90 S.W. of Stockholm. Lon. 15. 56 E. Lat. 58. 19. N.

SUDERMANIA, or Sudermanland, a province of Sweden Proper, 62 miles long and 42 broad; bounded on the N. by Upland and Westermania, on the E. by the peninsula of Tarin, on the S. by the Baltic, and on the W. by Nericia. It is the most populous part in Sweden, and abounds in corn, and mines of divers metals. Nikoping is the capital.

SUDERTELGE, a town of Sweden, in the province of Sudermania. It was formerly a considerable staple town, and has still a manufacture of worsted and silk stockings. It is 16 miles W.S.W. of Stockholm. Lon. 18. 0 E. Lat. 59. 10 N.

SUDOREE, one of the Faro Islands, in the Northern Ocean; remarkable for a dangerous whirlpool near it, which is occasioned by a crater, 61 fathoms deep in the centre. The danger, especially in storms, is very great; but at the reflux, and in very still weather, the inhabitants venture in boats, for the sake of fishing.

SUDORI'FIC. *a.* Provoking or causing sweat.

Sudorifics. (from *sudor*, sweat, and *facio*, to make.) A synonym of diaphoretics. See Diaphoretics.

SU'DOROUS. *a.* (from *sudor*, Lat.) Consisting of sweat: not used (*Brown*)

SUDS. *s.* (from ꞃeoꝺan, to seeth; whence ꞃoꝺꝺen, Saxon.) 1. A lixivium of soap and water. 2. *To be in the* Suds. A familiar phrase for being in any difficulty.

To SUE. *v. a.* (*suiver*, Fr.) 1. To prosecute by law (*Matthew*). 2. To gain by legal procedure. 3. (In falconry.) To clean the beak, as a hawk.

To Sue. *v. n.* To beg; to entreat; to petition (*Knolles*).

SU'ET. *s.* (*suet*, old Fr.) A hard fat, particularly that about the kidneys (*Wiseman*).

SUETONIUS TRANQUILLUS (Caius), a famous Latin historian, was born at Rome, and became secretary to the emperor Adrian, about the 118th year of the Christian era; but that post was taken from him three years after, when several persons fell under that prince's displeasure for not showing the empress Sabina all the respect she deserved. During his disgrace he composed many works, which are lost. Those now extant are his History of the XII first Emperors, and a part of his Treatise of the Illustrious Grammarians and Rhetoricians. Pliny the Younger was his intimate friend, and persuaded him to publish his books. His History of the XII Roman Emperors has been much commended by most of our polite scholars. He represents, in a continued series of curious and interesting particulars, without any digressions or reflections, the actions of the emperors, without omitting their vices, which he exposes with all their deformity, and with the same freedom mentions the good qualities of the very same persons; but the horrid dissoluteness and obscene actions he relates of Tiberius, Caligula, Nero, &c. have made some say, that he wrote the lives of the emperors with the same licentiousness with which they lived. The edition of this history produced by Grævius at Utrecht in 1672, with the excellent Commentaries of Torrentius and Casaubon, and the notes of some other learned critics, is much esteemed. Burman also published an edition in two vols. 4to. with notes, in 1736. The editio princeps was printed at Rome, in 1470, by Philip de Lignamine, and is a work of uncommon rarity and extraordinary value.

Gronovius's edition of 1698 is very excellent, and much superior to the Oxford ones of 1676 and 1690. There are several good editions by Janson, Ernesti, and others; but the latest, and in many respects the best, is Wolf's, published in 4 vols. 8vo. at Leipsic in 1802. It contains some valuable observations by D. Ruhnkenius, and the famous commentary of Casaubon, which occupies nearly the whole of the last two volumes.

SU'ETY. *a.* (from *suet.*) Consisting of suet; resembling suet (*Sharp*).

SUEVI, the Catti or Chatti of Cæsar (Strabo), placed on the Rhine: the reason of Cæsar's calling them thus does not appear, though considerably distant from the proper Suevi or Alemanni.

Suevi (Tacitus), a common name of the people situated between the Elbe and the Vistula, distinguished otherwise by particular names; as in Ptolemy, Suevi Angeli, Suevi Sennones.

SUEVUS (anc. geog.), a river of Germany, thought to be the same with the Viadrus or Oder, emptying itself at three mouths into the Baltic, the middlemost of which is called Swine or Swene; which last comes nearer the name Suevus.

SUEZ, a seaport of Egypt, with a castle, seated at the N. end of the W. gulf of the Red Sea, called the gulf of Suez. This gulf is separated from the Mediterranean, by an isthmus, 125 miles over, which joins Asia to Africa. The town is surrounded by a sandy country, and is without water. It is crowded with people, when the Turkish galleys arrive there, but at other times is almost deserted; and the harbour is too shallow to admit ships of great burden. It is 65 miles E. of Cairo. Lon. 32. 45 E. Lat. 30. 2 N.

To SU'FFER. *v. a.* (*suffero*, Lat. *souffrier*, Fr.) 1. To bear; to undergo; to feel with sense of pain (*Mark*). 2. To endure; to support; not to sink under (*Milton*). 3. To allow; to permit; not to hinder (*Locke*). 4. To pass through; to be affected by; to be acted upon (*Milton*).

To Su'ffer. *v. n.* 1. To undergo pain or inconvenience (*Locke*). 2. To undergo punishment (*Clarendon*). 3. To be injured (*Temple*).

SU'FFERABLE. *a.* (from *suffer.*) Tolerable; such as may be endured (*Wotton*).

SU'FFERABLY. *ad.* (from *sufferable.*) Tolerably; so as to be endured (*Addison*).

SU'FFERANCE. *s.* (*souffrance*, French.) 1. Pain; inconvenience; misery (*Locke*). 2. Patience; moderation (*Otway*). 3. Toleration; permission; not hinderance (*Hooker*).

SU'FFERER. *s.* (from *suffer.*) 1. One who endures or undergoes pain or inconvenience (*Addison*). 2. One who allows; one who permits.

SU'FFERING. *s.* (from *suffer.*) Pain suffered (*Atterbury*).

To SUFFI'CE. *v. n.* (*sufficio*, Lat.) To be enough; to be sufficient; to be equal to the end or purpose (*Locke*).

To Suffi'ce. *v. a.* 1. To afford; to supply (*Dryden*). 2. To satisfy; to be equal to want or demand (*Dryden*).

SUFFI'CIENCY. *s.* (from *sufficient.*) 1. State of being adequate to the end proposed (*Boyle*). 2. Qualification for any purpose (*Temple*). 3. Competence; enough (*Thomson*). 4. Supply equal to want (*Watts*). 5. It is used by *Temple* for that conceit which makes a man think himself equal to things above him.

SUFFI'CIENT. *a.* (*sufficiens*, Latin.) 1. Equal to any end or purpose; enough; competent; not deficient (*Swift*). 2. Qualified for any thing by fortune or otherwise (*Shaks.*).

SUFFI'CIENTLY. *ad.* (from *sufficient.*) To a sufficent degree; enough (*Rogers*).

SUFFI'SANCE. *s.* (Fr.) Excess; plenty: obsolete (*Spenser*).

To SU'FFOCATE. *v. a.* (*suffoquer*, Fr. *suffoco*, Lat.) To choak by exclusion or interception of air (*Collier*).

SUFFOCA'TION. *s.* (*suffocation*, Fr. from *suffocate.*) The act of choaking; the state of being choaked (*Cheyne*).

SU'FFOCATIVE. *a.* (from *suffocate.*) Having the power to choak (*Arbuthnot*).

SUFFOLK, a county of England, 58 miles long and 28 broad; bounded on the W. by Cambridgeshire, on the N. by Norfolk, on the S. by Essex, and on the E. by the German Ocean. It lies in the diocese of Norwich; contains 22 hundreds, 28 market-towns, 575 parishes, and 233,899 inhabitants (see Population); and sends 16 members to parliament. The air is clear and healthy. The soil is of various qualities, but the country in general level. That near the shore is sandy and full of heaths, yet abounds in rye, peas, turnips, carrots, and hemp, with numerous flocks of sheep. Copious beds of petrified shells, called shell-marl, which are found in various parts between Woodbridge and Orford, have for many years been made use of for improving light land. High Suffolk, or the Woodlands, which is in the inland part, has a rich deep clay and marl, that yields good pasture, on which feed abundance of cattle. That part on the confines of Essex and Cambridgeshire affords also excellent pasture; and to the N. and N.W. it is fruitful in corn. Its chief produce is butter and cheese; but the latter has gained, almost proverbially, the character of the worst in England. The principal rivers are the Stour, Waveny, Little Ouse, Larke, Deben, Gipping, and Orwell. Ipswich is the principal town; but the assizes are held at Bury St. Edmund's.

Suffolk, a town of Virginia, in Nansemond county, situate on the river Nansemond, 28 miles W. by S. of Portsmouth. Lon. 79. 42 W. Lat. 42. 38 N.

SU'FFRAGAN. *s.* (*suffraganeus*, Lat.) A bishop considered as subject to his metropolitan (*Ayliffe*).

To SU'FFRAGATE. *v. n.* (*suffragor*. Lat.) To vote with; to agree in voice with (*Hale*).

SU'FFRAGE. *s.* (*suffragium*, Lat.) Vote; voice given in a controverted point (*Addison*).

SUFFRA'GINOUS. *a.* (*suffrago*, Latin.) Belonging to the knee joint of beasts (*Brown.*)

SUFFRUTEX. (from *sub*, under, and *frutex*, a shrub.) In botany. An undershrub. Permanent or woody at the base, but the yearly branches decaying; usually of a lower growth than the frutex or shrub; as in lavender, sage, thyme, &c.

SUFFRUTICOUS. Suffruticose. Undershrubby.

SUFFUMIGA'TION. *s.* (*suffumigo*, Lat.) Operation of fumes raised by fire (*Wiseman*).

SUFFU'MIGE. *s.* (*suffumigo*, Lat.) A medical fume: not used (*Harvey*).

To SUFFU'SE. *v. a.* (*suffusus*, Latin.) To spread over with something expansible, as with a vapour or a tincture (*Pope*).

SUFFU'SION. *s.* (from *suffuse.*) 1. The act of overspreading with any thing. 2. That which is suffused or spread (*Dryden*).

SUGAR, (*shaccar*, Arab.) the general basis of sweetness in all vegetable substances. When pure, it is perfectly transparent; and if crystallized, colourless; but when granular, of a pure glossy white, soluble in water and alcohol, without smell, and with the taste of simple sweetness, totally void of flavour. It melts by heat into a clear, yellowish, tenacious liquid; and when kindled, burns with a strong flame, and a very pungent acid vapour. With the nitric acid it is convertible chiefly into the oxalic acid. It is a most powerful antiseptic, and is one of the most grateful (and when in mixture) one of the most nutritive of all the alimentary substances derived from the vegetable kingdom. Sugar is never found pure, and very rarely in a state approaching to purity, for it is always intimately combined with mucilage and other vegetable principles, to which it largely imparts its peculiar taste.

CANE SUGAR.

The plant from which this useful material is commonly obtained is the saccharum officinarum of Linnéus. See the article SACCHARUM. It is prepared from the expressed juice boiled with the addition of quick lime or common vegetable alkali. It may be extracted also from a number of plants, as the maple, birch, wheat, corn, beet-root, skirret, parsnips, dried grapes, &c. by digesting in alkohol. The alkohol dissolves the sugar, and leaves the extractive matter untouched, which falls to the bottom. It may be taken into the stomach in very large quantities, without producing any bad consequences, although proofs are not wanting of its mischievous effects, by relaxing the stomach, and thus inducing disease. It is much used in pharmacy, as it forms the basis of syrups, lozenges, and other preparations. It is very useful as a medicine, to favour the solution or suspension of resins, oils, &c. in water, and is given as a purgative for infants.

Sugar is every where the basis of that which is called sweetness. Its presence is previously necessary in order to the taking place of vinous fermentation. Its extraction from plants which afford it in the greatest abundance, and its refinement for the common uses of life, in a pure and separate state, are among the most important of the chemical manufactures. The sugar cane, however, yields sugar in a proportion so much larger than that in which the same matter is to be obtained from any other, that only this cane has been as yet cultivated expressly for the purpose of affording sugar to the extraction of the manufacturer. This cane has been from the most ancient times known in Asia. Of its produce, some small proportion appears to have been, during the greatness of ancient Rome, imported by circuitous channels into Europe. In the progress of the subsequent ages, the plant itself became known in Europe, and was introduced into cultivation. Before the data of the discovery of America, it was no uncommon cultivation in Spain. The Spaniards carried out plants of the sugar cane to America; but the plant had been, even before, propagated in this hemisphere. They had not been long seated in their new colonial seats, till they made sugar a principal article in their manufacture and agriculture. It has continued ever since to be the principal produce of the European colonial territories in the West India isles. It is produced also in very large quantities in the East. The Anglo-Americans extract it from the maple-tree. The cane is a produce of all the South Sea isles of late discovery.

The following is the mode of its manufacture in the West Indies. The plants are cultivated in rows, on fields enriched by such manures as can most easily be procured, and tilled with the plough. They are annually cut. The cuttings are carried to the mill. They are cut into short pieces, and arranged in small bundles. The mill is wrought by water, wind, or cattle. The parts which act on the canes are upright cylinders. Between these the canes are inserted, compressed, squeezed till all their juice is obtained from them, and are themselves, sometimes, even reduced to powder. One of these mills of the best construction bruises canes to such a quantity as to afford, in one day, 10,000 gallons of juice, when wrought with only ten mules. The expressed juice is received into a leaden bed. It is thence conveyed into a vessel called the receiver. The juice is found to consist of eight parts of pure water, one part of sugar, one part of oil and gummy mucilage. From the greener parts of the canes there is apt to be at times derived an acid juice, which tends to bring the whole unseasonably into a state of acid fermentation. Fragments of the ligneous part of the cane, some portions of mud or dirt which unavoidably remain on the canes, and a blackish substance called the crust, which coated the canes at the joints, are also apt to enter into contaminating mixture with the juice. From the receiver the juice is conducted along a wooden gutter lined with lead to the boiling house. In the boiling house it is received into copper pans or cauldrons, which have the name of clarifiers. Of these clarifiers the number and the capacity must be in proportion to the quantity of canes, and the extent of the sugar plantation on which the work is carried on. Each clarifier has a syphon or cock, by which the liquor is to be drawn off. Each hangs over a separate fire; and this fire must be so confined, that by the drawing of an iron slider fitted to the chimney, the fire may be at any time put out. In the progress of the operations, the stream of juice from the receiver fills the clarifier with fresh liquor. Lime in powder is added in order to take up the oxalic acid, and the carbonaceous matters which are mingled with the juice. The lime also in the new salts, into the composition of which it now enters, adds itself to the sugar, as a part of that which is to be obtained from the process. The lime is to be put in in the proportion of somewhat less than a pint of lime to every hundred gallons of liquor. When it is in too great quantities, however, it is apt to destroy a part of the pure saccharine matter. Some persons employ alkaline ashes, as preferable to lime, for the purpose of extracting the extraneous matter; but it is highly probable that lime judiciously used might answer better than any other substance whatsoever. The liquor is now to be heated almost to ebullition. The heat dissolves the mechanical union, and thus favours the chemical changes in its different parts. When the proper heat appears, from a rising scum on the surface of the liquor, to have been produced, the fire is then extinguished by the application of the damper. In this state of the liquor, the greater part of the impurities, being different in specific gravity from the pure saccharine solution, and being also of such a nature as to yield more readily to the chemical action of heat, are brought up to the surface in a scum. After this scum has been sufficiently formed on the cooling liquor, this liquor is carefully drawn off, either by a syphon, which raises a pure stream through the scum, or by a cock drawing the liquor at the bottom from under the scum. The scum in either case sinks down unbroken, as the liquor flows; and is now, by cooling, of such tenacity, as not to send to any intermixture with the liquor. The liquor drawn, after this purification, from the boiler, is received into a gutter or channel, by which it is conveyed to the grand copper, or evaporating boiler. If made from good canes, and properly clarified, it will now appear almost transparent. In this copper, the liquor is heated to actual ebullition. The scum raised to the surface by the boiling is skimmed off as its rises. The ebullition is continued till there be a considerable diminution in the quantity of the liquor. The liquor now appears nearly of the colour of Madeira wine. It is at last transferred into a second and smaller copper. An addition of lime-water is here made, both to dilute the thickening liquor, to detach superabundant acid, and to favour the formation of the sugar. If the liquor be now in its proper state, the scum rises in large bubbles, with very little discoloration. The skimming and the evaporation together produce a considerable diminution in the quantity of the liquor. It is then transferred into another smaller boiler. In this last boiler the evaporation is renewed, and continued till the liquor is brought to that degree of thickness at which it appears fit to be finally cooled. In the cooler, a shallow wooden vessel of considerable length and wideness, commonly of such a size as to contain a hogshead of sugar; the sugar, as it cools, granulates, or runs into an imperfect crystallization, by which it is separated from the melasses, a mixed saccharine matter too impure to be capable even of this imperfect crystallization. To determine whether the liquor be fit to be taken from the last boiler to be finally cooled, it is necessary to take out a portion from the boiler, and try separately, whether it does not separate into granulated sugar and melasses. From the cooler the sugar is removed to the curing house. This is a spacious airy building. It is provided with a capacious cistern for the reception of melasses, and over the cistern is erected a frame of strong joist-work, unfilled and uncovered. Empty hogsheads, open at the head, bored at the bottom with a few holes, and having a stalk of plantain leaf thrust through each of the holes, while it rises at the same time through the inside of the hogshead, are disposed upon the frames. The mass of saccharine matter from the coolers is put into these hogsheads. The melasses drip into the cistern through the spongy plantain stalks in the holes. Within the space of three weeks the melasses are sufficiently drained off, and the sugar remains dry. By this process it is at last brought into the state of what is called muscovado or raw sugar. This is the general process in the British West Indies. In this state our West India sugar is imported into Britain. The formation of loaves of white sugar is a subsequent process. In the French West India isles it has long been customary to perform the last part of this train of processes in a manner somewhat different, and which affords the sugar in a state of greater purity. This preparation, taking the sugar from the cooler, then puts it, not into hogsheads with holes in the bottom as above, but into conical pots, each of which has at its bottom a hole half an inch in diameter, that is in the commencement of the process stopped with a plug. After remaining some time in the pot, the sugar becomes perfectly cool and fixed. The sugar is then removed out of the hole; the pot is placed over a large jar, and the melasses are suffered to drip away from it. After as much of the melasses as will easily run off has been thus drained away, the surface of the sugar in the jar is covered with a stratum of fine clay, and water is poured upon the clay. The water oozing gently through the pores of the clay pervades the whole mass of sugar, redissolves the melasses still remaining in it, with some parts of the sugar itself, and carrying these off by the holes in the bottom of the pot, renders that which resists the solution much purer than the muscovado sugar made in the English way. The sugar prepared in this manner is called clayed sugar. It is sold for a higher price in the European markets than the muscovado sugar; but there is a loss of sugar in the process by claying, which deters the British planters from adopting this practice so generally as do the French.

The raw sugars are still contaminated and debased by a mixture of acid, carbonaceous matter, oil, and colouring resin. To free them from these is the business of the European sugar bakers. A new solution; clarification with alkaline substances fitted to attract away the oil, acid, and other contaminating matters; slow evaporation; and a final cooling in suitable moulds; are the processes which at last produce loaves of white sugar.

The melasses being nothing else than a very impure refuse of the sugar from which they drip, are susceptible of being employed in a new ebullition, by which a second quantity of sugar may be obtained from them. The remainder of the melasses is employed to yield rum by distillation.

In rum, alkohol is mixed with oil, water, oxalic acid, and a mixture of empyreumatic matter. The French prepare, from the mixture of melasses with water, a species of wine of good quality. In its preparation, the solution is brought into fermentation, then passed through strainers to purify it, then put in casks; after clearing itself in these, transferred into others, in which it is to be preserved for use. The ratio of these processes is extremely beautiful; they are all directed to purify the sugar from contaminating mixtures, and to reduce it into that state of dryness or crystallization, in which it is susceptible of being the most conveniently preserved for agreeable use. The heat in general acts both mechanically to effect a sufficient dissolution of the aggregation of the parts of the cane juice, and chemically, to produce in it new combinations into which caloric must enter as an ingredient. The first gentle heat is intended chiefly to operate with the mechanical influence, raising to the surface impurities which are more easily removed by skimming than by any other means; a gentle, not a violent heat, is in this instance employed, because a violent heat would produce empyreumatic salts, the production of which is to be carefully avoided. A boiling heat is, in the continuation of the processes, made use of, because, after the first impurities have been skimmed off, contaminating empyreumatic salts are less readily formed, because a boiling heat is necessary to effect a complete developement of the saccharine matter, and because the gradual concentration of the sugar is, by such a heat, to be best accomplished. Lime is employed, because it has a stronger affinity than sugar with all the contaminating matters, and particularly because it attracts into a neutral combination that excess of oxalic acid which is apt to exist in the saccharine solution. Skimming removes the new salts which the most easily assume a solid form. The dripping carries away a mixture of water, oil, earth, sugar, from the crystallized sugar: for, in all our crystallizations, we can never perform the process in the great way, with such nicety as to preserve it free from an equality of proportions, that must necessarily occasion a residue. Repeated solution, clarification, evaporation, are requisite to produce pure white sugar from the brown and raw sugars; because the complete purification of this matter from acid and colouring matter is an operation of great difficulty, and not to be finally completed without processes which are longer than can be conveniently performed, at the first, upon the sugar plantation.

From vegetables of European growth sugar is not to be easily obtained, unless the process of germination be first produced in them; or unless they have been penetrated by intense frost. Germination, or thorough freezing, developes sugar into all vegetables in which its principles of hydrogen and carbon, with a small proportion of oxygen, exist in any considerable plenty. It is not improbable, but that if penetration by a freezing cold could be commanded at pleasure, with sufficient cheapness, it would enable us to obtain saccharine matter in a large proportion, from a variety of substances, from which even germination does not yield a sufficient quantity. In the sugar beet, and some other European vegetables, sugar is naturally formed by the functions of vegetation to perfect combination. From these the sugar is obtained by rasping down the vegetable, extracting by water its saccharine juice, evaporating the water charged with the juice to the consistency of syrup, clarifying, purifying, and crystallizing it, just in the same manner as sugar from the sugar cane.

MAPLE SUGAR.

A valuable sugar is extracted in many of the states of North America from the juice or sap of the sugar-maple. The tree is tapped with an augre which is introduced about two inches, and a projecting spout is made below it, under which troughs are set to catch the juice. The season for tapping is from February to April, for about six weeks, during which time a moderate sized tree will yield from twenty to thirty gallons of sap, from which may be made about five or six pounds of pretty good sugar. During the rest of the year the sap will flow from the wound, but in too thin and watery a state to be used with advantage for making sugar. This evacuation does not appear at all to injure the tree, for the same process may be repeated every year for a great length of time; and the juice is even more saccharine from trees that have been previously wounded than from fresh trees. The juice is clear and pleasant tasted. It is made into sugar by the farmers in the country, and with a simple apparatus. It is usually clarified with lime and white of egg, or milk, boiled down, grained and clayed in the manner of the cane-juice. Another method occasionally practised is to reduce the quantity of liquid by freezing, when the season will allow of it, which is preferable to entire evaporation, and at the same time cheaper. The common maple sugar is clean to the eye and very sweet, but possesses a peculiar, though not an unpleasant taste. It may be made into loaf-sugar probably as well as the muscovado, but it is chiefly employed in a half purified state, like the common moist sugars. The maple-juice will also furnish a pleasant wine and a good vinegar. The saccharine quality of the juice appears to be highly improved by a careful cultivation of the tree.

BEET-ROOT SUGAR.

Among the vegetables indigenous to the middle and north of Europe which are sensibly saccharine, the beet-root seems to exceed them all in the quantity of sugar it contains. The carrot and parsnip have been tried, but the quantity of sugar possessed by these has not repaid the trouble of working them. Marggraf, who first attempted the beet-root, attempted also the skirret-root, and obtained from this last a small proportion of a good grained sugar, equal to muscovado, from which a syrup separated and dropped through when the plug was withdrawn: but the process was tedious, and the proportion not sufficient to justify its introduction into general use.

The most successful manufacturer of sugar from the beet-root (unless the present attempts in France, with the extent of which, however, we are not much acquainted), is M. Achard of Berlin, who pursued the process altogether in the large way, and so satisfactorily, that a reward was bestowed upon him by the Prussian government for his elaborate experiments. It was hoped, indeed, that this process would enable Europe to supply itself with sugar from its own soil, and to be no longer dependent on the West Indies; it has for many years, however, been relinquished, and hence there can be no doubt that it was not found to answer upon the broad scale.

The plant employed was the white beet, the root of which resembles the parsnip in shape, and is white crossed with bands of red, and has a mild sweetish taste. It is remarkably succulent, and the saccharine quality of the juice seems to be much improved by a careful cultivation in a rich soil. It has long been cultivated in many parts of Germany as a food for cattle.

The following is M. Achard's process. The roots are pulled, cleaned, and stripped of the leaves; and immediately boiled for a short time, till they are so far softened that a straw may be thrust into them. They are then sliced by a machine used in the country for slicing potatoes, and put under a very strong press to extract the juice. The cake which remains in the press still retains enough juice to make it worth while to moisten it with water, and after some hours again to press it; this juice is mixed with the former. Even after this second pressing the cake may be usefully employed in making a fermented liquor, from which a spirit may be extracted by distillation. The juice is then strained through a flannel, boiled down to two thirds of its original bulk, again strained through a thick blanket, and then boiled down to half its bulk and strained. It is now of the consistence of a thin syrup, and must be put in shallow pans in a stove-room, heated to about 120° to allow the sugar to crystallize. This begins by the formation of a hard crust on the surface, which must be now and then broken down to hasten the evaporation. After a time there forms on the surface a thick gummy skin, instead of a hard granular crust; when this appears, the syrup is removed from the stove-room, and the whole mass is put into a close linen sack, previously wetted, and strongly but gradually pressed. By this the syrup is forced through the sack, and there remains within it a yellow, granular, saccharine mass, resembling muscovado sugar, very sweet and well-tasted. From this sugar of any degree of fineness may be afterwards obtained by the processes employed in the refining of sugar-cane.

Such was M. Achard's process, which has been since repeated by a commission from the French National (now Imperial) Institute, with similar results as to the general products, though the quantity yielded was much less than what might be inferred from the price stated by the inventor as the first cost to the manufacturer. According to these subsequent experiments pursued precisely in M. Achard's method, 1152 parts of fresh beet-root yielded 18 parts of raw muscovado, which was brown and ill tasted, and would require successive purifications with the loss of from a third to nearly half its weight to bring it into the state of fine saleable sugar.

Professor Lampadius of Freyberg has since pursued a series of experiments upon the same material; but he candidly confesses, that in one of them made on a hundred quintals of the root, the sugar obtained sold for somewhat less than the entire cost of the materials and the process; this, however, was in a cold, unfavourable year, and did not include the profits to be obtained from all the residues in yielding, by fermentation, an ardent spirit or kind of rum.

CHEMICAL PROPERTIES OF SUGAR.

Pure sugar appears either in a regularly crystallized form, or in shining white crystalline grains: both in candy and in loaf it is very hard and brittle; when rubbed in the dark it is highly luminous.

The earths proper do not seem to have any action whatever on sugar; but the alkaline earths unite with it. When lime is added to a solution of sugar in water, and the mixture boiled for some time, a combination takes place. The liquid still indeed retains its sweet taste; but it has acquired also a bitter and astringent one. A little alkohol added to the solution produced a precipitate in white flakes, which appeared to be a compound of sugar and lime. Sulphuric acid precipitated the lime in the state of sulphat, and restored the original taste of the sugar. When the compound of sugar and lime was evaporated to dryness, a semitransparent tenacious syrup remained, which had a rough bitter taste, with a certain degree of sweetness.

The fixed alkalies combine with sugar, and form compounds not unlike that which has been just described. Potass destroys the sweet taste of syrup more completely than lime; but when it is neutralized by sulphuric acid, and the sulphat precipitated by alkohol, the sweet taste is completely restored. When alkohol is agitated with the compound of sugar and potass dissolved in water, it refuses to unite with it, but swims on the top in a state of purity.

The acids are capable of dissolving sugar, and those which are concentrated decompose it. Sulphuric acid very soon acts upon it; water is formed, and perhaps also acetic acid; while charcoal is evolved in great abundance, and gives the mixture a black colour, and a considerable degree of consistency. The charcoal may be easily separated by dilution and filtration. When heat is applied, the sulphuric acid is rapidly converted into sulphureous acid.

Nitric acid dissolves it with an effervescence, occasioned by the evolution of nitrous gass, and converts it into malic and oxalic acids. 480 grains of sugar, treated with six ounces of nitric acid diluted with its own weight of water, and cautiously heated, separating the crystals as they formed, yielded 280 grains of oxalic acid; so that 100 parts of sugar yield by this treatment 58 parts of oxalic acid. When liquid oxymuriatic acid is poured upon sugar in powder it is dissolved, and immediately converted into malic acid; and the oxymuriatic acid is converted into common muriatic acid.

Sugar absorbs muriatic acid gass slowly, and assumes a brown colour and very strong smell. The vegetable acids dissolve it; but seemingly without producing any alteration on it.

The action of the oxides of carbon and azote upon sugar has scarcely been examined.

Sugar is soluble in alkohol, but not in so large a proportion as in water. According to Wenzel, four parts of boiling alkohol dissolve one of sugar. It unites readily with oils, and renders them miscible with water. A moderate quantity of it prevents, or at least retards, the coagulation of milk; but Scheele discovered that a very large quantity of sugar causes milk to coagulate.

The hydrosulphurets, sulphurets, and phosphurets of alkalies and alkaline earths, seem to have the property of decomposing sugar, and of bringing it to a state not very different from that of gum. Mr. Cruikshank introduced a quantity of syrup into a jar standing over mercury, and then added about an equal quantity of phosphuret of lime. Phosphureted hydrogen gass was immediately extricated. In eight days the syrup was withdrawn: it had lost its sweet taste, and acquired a bitter and astringent one (the taste of phosphuret of lime). From this solution alkohol threw down white flakes, very much resembling those of mucilage separated from water by the same liquid. A little sugar was dissolved in alcohol, and phosphuret of lime added to it. No apparent action took place. The mixture, after standing in the open air for some days, was evaporated, and water added. No gass was disengaged, as the phosphuret had been converted into a phosphat. The liquid being filtered and evaporated, a tenacious substance remained, much resembling gum arabic. Its taste was bitter, with a slight degree of sweetness. It did not seem soluble in alcohol. It burned like gum.

When sugar is distilled in a retort, there comes over a fluid which at first scarcely differs from pure water; soon it is mixed with what was formerly called pyromucous acid, and is now known to be a compound of oil and acetic acid; afterwards some empyreumatic oil makes its appearance, and a bulky charcoal remains in the retort. This charcoal very frequently contains lime, because lime is used in refining sugar; but if the sugar, before being submitted to distillation, is dissolved in water, and made to crystallize by evaporation in a temperature scarcely higher than that of the atmosphere, no lime whatever, nor any thing else, except pure charcoal, will be found in the retort. During the distillation, there comes over a considerable quantity of carbonic acid and carbureted hydrogen gass. Sugar, therefore, is decomposed by the action of heat; and the following compounds are formed from it: water, acetic acid, oil, charcoal, carbonic acid, carbureted hydrogen gass. The quantity of oil in a separate state is inconsiderable; by far the most abundant product is pyromucous acid. Sugar, indeed, is very readily converted into pyromucous acid; for its makes its appearance always whenever syrup is raised to the boiling temperature. Hence the smell of caromel which syrup at that temperature emits. Hence also the reason, that, when we attempt to crystallize syrup by heat, there always remains behind a quantity of incrystallizable matter, known by the name of molasses: whereas, if the syrup is crystallized without artificial heat, every particle of sugar may be obtained from it in a crystalline form. Hence we see the importance of properly regulating the fire during the crystallization of the sugar, and the saving that would probably result from conducting the operation at a low heat.

We are indebted to Mr. Cruikshank for the most precise set of experiments on the decomposition of sugar by heat. 480 grains of pure sugar were introduced into a coated retort, and heated gradually to redness. The products were,

Pyromucous acid with a drop or two of oil - - -	270 grains
Charcoal - - - -	120
Carbureted hydrogen, and carbonic acid gass - - -	90
	480

The pyromucous acid required about 75 grains of a solution of potass to saturate it; and when thus neutralized, no ammonia was disengaged. Hence sugar contains no azote, unless we suppose a very minute portion to be present in the pyromucous acid; and even this is not likely. The charcoal burns away without leaving any residue. Hence sugar contains no earth nor fixed alkali. The proportion of the gasseous products was 119 ounce-measures of carbureted hydrogen, and 41 ounce-measures of carbonic acid gass. The carbureted hydrogen, according to the experiments of Cruikshank, was composed of five parts carbon and one hydrogen.

These experiments are sufficient to show us that sugar is composed entirely of oxygen, carbon and hydrogen. It is of course a vegetable oxide. Lavoisier has concluded, from a series of experiments on the vinous fermentation, that these substances enter into the composition of sugar in the following proportion:

64	oxygen
28	carbon
8	hydrogen
100	

But these proportions can only be considered as very distant approximations to the truth.

From the experiments of different chemists, especially of Proust and Gottling, it appears that there are different species of sugar found ready prepared in the vegetable kingdom; distinguished from each other by the figure of their crystals, and other variations in their properties. The species hitherto examined are three in number, namely, common sugar, sugar of grapes, and sugar of beet. As far as is known at present, there is no difference between the sugar of the maple and common sugar.

That grapes contain abundance of sugar has been long known. The duc de Bouillon first extracted it from the juice of grapes, and Proust pointed out the difference between it and common sugar. The juice of grapes, according to him, yielded from 30 to 40 per cent. of this sugar.

Margraf discovered sugar in the root of the beta vulgaris; but it is to Achard that we are indebted for the first attempts to extract it from that plant in a large way. The experiments of that philosopher, of Lampadius, of the committee appointed by the National Institute, and of Goettling, have thrown more light on this interesting subject. The method which succeeded best with Achard was to boil the beet-roots (deprived of the heart) till they became so soft as to be easily pierced by a straw. They are then cut into slices, and the juice forced out by pressure. What remains is left for twelve hours in water, and the whole subjected to the press a second time. The liquids thus obtained are filtered through flannel, boiled down to two-thirds, filtered a second time, reduced by boiling to one-third of the original liquid, filtered a third time, and then evaporated to the consistence of syrup. The crystalline crust which forms on the surface is to be broken from time to time, and the spontaneous evaporation continued till the surface becomes covered with a tough coat instead of crystals. The whole is then to be thrown into woollen bags, and the mucilaginous liquid separated from the crystals by pressure.

The sugar obtained by these processes has much the appearance of raw sugar; but it may be refined by the common processes, and brought into the state of common sugar. From the experiments of Goettling, it appears that beet-sugar is distinguished by a certain degree of a nauseous bitter taste; owing, it is supposed, to the presence of a bitter extractive matter, which Lampadius has shown to be one of the constituents of the beet.

The plants containing sugar are very numerous. The following are the chief of those from which it has been actually extracted by chemists.

The sap of the acer saccharinum,
———— betula alba,
———— asclepias syriaca,
———— heraclium sphondilium,
———— cocos nucifera,
———— juglans alba,
———— agave Americana,
———— fucus saccharinus,
———— ficus carica,

The juice of arundo saccharifera,
——— zea mays,
The roots of pastinaca sativa,
——— sium sisarum,
——— beta vulgaris and cicla,
——— daucus carota,
——— apium petroselinum.

Parmentier has also ascertained, that the grains of wheat, barley, &c. and all the other similar seeds which are used as food, contain at first a large quantity of sugar, which gradually disappears as they approach to a state of maturity. This is the case also with peas and beans, and all leguminous seeds: and is one reason why the flavour of young peas is so much superior to that of old ones.

Sugar has also, within the last two years, been attempted to be obtained from wheat and other starches by a process somewhat similar to that of malting; or, in other words, by an union of a certain portion of oxygen with the matter of the starch; for the sweetness or saccharine property of the malt is now generally ascribed to a decomposition of the water in which the barley is soaked by the starch of this grain, and a peculiar combination of the two principles. In the very ingenious discovery we now advert to, however, the process is quickened and perfected by a mixture of a small proportion of sulphuric acid. The discoverer is M. Kirchhoff of St. Petersburg: and the experiment was thus repeated at the Royal Institution by Mr. Moore, whose words we shall quote.

"The original experiment was made by boiling together 100 parts of starch, 400 parts of water, and one part of sulphuric acid, for 36 hours, on a slow fire, in a covered vessel, adding from time to time water for that which boiled away: towards the expiration of that time some charcoal in powder was put in; and lastly, enough of carbonate of lime to saturate the acid: the solution was then filtered, evaporated to the consistence of a thick syrup, and put to crystallize; which generally takes place in three days. In repeating this experiment I got some starch not converted, which was owing, I believe, to the heat not being sufficiently strong, with the intention of shortening the time of boiling. I increased the quantity of sulphuric acid (at the suggestion of professor Berzelius in a second trial) to 3 per cent. I have also made trials with 4, 5, 6, and 8 per cent. of acid, but they did not either increase the result, or shorten the time of boiling, as much as I expected. I have also made experiments with the starch of potatoes, in the same proportions as that of wheat which I used in my first trials: the only difference I could perceive between them was, that the sugar was not so abundant from the potatoe starch, and that it contained more gummy matter than the sugar obtained from that of wheat. I observed that they do not possess the property of sweetening liquids at all equal to the sugar from the juice of the cane. I have not been able to procure either of them sufficiently crystallized to state the difference of either of them (if any) from each other, or from any other sugar. My experiments at present are not sufficiently complete to warrant my giving either a statement of the quantity produced, or of the expense of the process; indeed this would be foreign to my first object, which was to repeat the experiment; but I am convinced it cannot be an object at present in Britain. I am assured it was lately in contemplation to adopt in on a large scale in the Russian empire, as the price of cane sugar was increased so much, and the supply was so uncertain.

"I shall not presume to give the rationale of this process at present. I am ignorant of that advanced by the able discoverer (M. Kirchhoff); but I must dissent from the opinion given by M. Nasse, who thinks the sulphuric acid is decomposed. I have weighed the quantity of lime it required to saturate the acid used in the experiments; and also of that used to saturate an equal weight of the same acid diluted with water, and I find them to agree exactly."

M. Vogel, in his remarks on this subject, seems to think that increasing the quantity of acid hastened the formation of the sugar. He only obtained the syrup; time did not permit him to go further: we are therefore, for the present, deprived of that able chemist's remarks on this subject.

SUGAR CANDY.

This well known material is nothing more than sugar brought to a regular form by slow crystallization. The management of it differs considerably from that of loaf sugar. To prepare it, the syrup is clarified as usual, and boiled down to a certain point, but not so much as for making loaf-sugar. It is then poured into large oblong moulds or boxes, into which a light frame is previously fixed, holding, stretched from one end to the other, a number of cords of packthread. The mould filled with syrup is then put into the drying stove, and suffered to remain undisturbed for a considerable time, during which the sugar gradually deposits in crystals around the threads. The mould is then removed, and the frame is lifted out, with every thread thickly and very beautifully encrusted with the candy, and is afterwards drained to free it from the adhering syrup. Sugar candy is more transparent and much harder than common sugar. The brown sort crystallizes full as regularly as the white, but becomes clammy and deliquescent in a damp air, while the white remains always dry. On account of its superior hardness it is less soluble than the loaf-sugar, and appears to have much less taste, but it has full as strong a body of sugar, and would be excellently calculated for preserving all vegetable food if the price were lower.

Since printing this article we have received M. Vogel's very curious paper on the conversion of starch into sugar, and shall therefore give its contents under the article WHEAT SUGAR.

SUGAR CANE. See SACCHARUM.

SUGAR MAPLE. See ACER.

To SU'GAR. *v. a.* (from the noun.) 1. To impregnate or season with sugar (*Crashaw*). 2. To sweeten (*Fairfax*).

SU'GARY. *a.* (from *sugar.*) Sweet; tasting of sugar (*Spenser*).

SUGELMESSA, or SIGELMESSA, a province of Barbary, bounded on the S. by the kingdom of Tafilet, and on the N. by Mount Atlas. It is about 100 miles in length; abounds in corn, dates, and other fruits, and has mines of iron, lead, and antimony. The government is a republic. The capital, of the same name, is seated on the Zig, 150 miles N.N.E. of Tafilet. Lon. 5. 5 W. Lat. 29. 40 N.

To SUGGE'ST. *v. a.* (*suggesto, suggestum*, Latin; *suggerer*, French.) 1. To hint; to intimate; to insinuate good or ill; to tell privately (*Locke*). 2. To seduce; to draw to ill by insinuation: not used (*Shakspeare*). 3. To inform secretly: not used (*Shakspeare*).

SUGGE'STER. *s.* (from *suggest.*) One that reminds another.

SUGGE'STION. *s.* (from *suggest.*) 1. Private hint; intimation; insinuation; secret notification (*Locke*). 2. Secret incitement.

To SU'GGILATE. *v. a.* (*sugillo*, Lat.) To beat black and blue; to make livid by a bruise (*Wiseman*).

SU'ICIDE. *s.* (*suicidum*, Latin.) 1. Self-murder; the horrid crime of destroying one's self (*Savage*). 2. A self-murderer. See FELO DE SE.

SUIDAS, author of a Greek Lexicon, the best edition of which was published, with a Latin version and notes, by Kuster, at Cambridge, in 1705, in 3 vols. folio. His country, and even the age in which he lived, are alike unknown. Dr. Bentley says, "As for Suidas, he has brought down a point of chronology to the death of the emperor Zimisces, that is, to the year of Christ 975: so that he seems to have written his Lexicon between that time and the death of the succeeding emperor, which was in 1025."

SUI'LLAGE. *s.* (*souillage*, French.) Drain of filth: obsolete (*Wotton*).

SUILLUS. Swine-stone. In mineralogy, a genus of the class earths, order calcareous. Consisting of carbonat of lime, carbonic acid, sulphurated hydrogen and water; when scraped on or rubbed emits an urinous or garlicky smell; soluble almost entirely in acids with effervescence; burning into quicklime. Five species.

1. S. marmoreus. Black marble. Common swinestone. Opake, compact, black, receiving a fine polish, with the fragments more or less convex. Found in the stratified mountains of Sweden, Belgium, Franconia, Bohemia, and Silesia, often abounding in petrified bodies, breaking into indeterminate fragments, and without internal lustre.

2. S. schistosus. Schistous marble. Flisten. Opake, compact, sessile, with flat fragments. Found in stratified mountains of Britain, Sweden, Silesia, and other parts of Europe, frequently among coal, with often the impressions of plants and fishes; colour black, yellowish-brown, cinereous, or dark grey.

3. S. lamellosus. Sparry dysodes. Of a lamellar texture. Found in the calcareous mountains of Sweden and Thuringia, parasitical, black or brown, rarely yellowish, the foliations larger or smaller.

4. S. botryoides. Botryoidal limestone. Gorsten. In hollow globules, crystallized within, and connected like a bunch of grapes. Found in various parts of Britain and in Sweden, and seems formed by calcareous water passing through loose, marly earth; the globules are smaller or larger; colour yellowish, occasioned by oxyd of iron with more or less clay.

5. S. crystallinus. Radiated or crystallized swinestone. Crystallized in elongated six-sided pyramids; with the crystals diverging, or spherically clustered. Found under the common soil in Sweden, Westrogoth, and Oeland.

SU'ING. *s.* The act of soaking through any thing: not used (*Bacon*).

SUIT. *s.* (*suite*, French.) 1. A set; a number of things correspondent one to the other (*Dryden*). 2. Clothes made one part to answer another (*Donne*). 3. Consecution; series; regular order (*Bacon*). 4. *Out of* SUITS. Having no correspondence (*Shakspeare*). 5. Retinue; company (*Sidney*). 6. (from *To sue.*) A petition; an address of entreaty (*Donne*). 7. Courtship (*Shakspeare*). 8. Pursuit; prosecution (*Spenser*). 9. (In law.) *Suit* is sometimes put for the instance of a cause, and sometimes for the cause itself deduced in judgment (*Ayliffe*).

SUIT COVENANT. (In law.) Is where the ancestor of one man covenanted with the ancestor of another to sue at his court (*Bailey*).

SUIT COURT. (In law.) Is the court in which tenants owe attendance to their lord.

SUIT SERVICE. (In law.) Attendance which tenants owe to the court of their lord (*Bailey*).

SUIT, in law, the same with action. The Romans introduced pretty early set forms for actions and suits into their law, after the example of the Greeks; and made it a rule, that each injury should be redressed by its proper remedy only. "Actiones (say the Pandects), compositæ sunt quibus inter se homines disceptarent, quas actiones ne populus prout vellet institueret, certas solemnesque esse voluerunt." The forms of these actions were originally preserved in the books of the pontifical college as choice and inestimable secrets, till one Cneius Flavius, the secretary of Appius Claudius, stole a copy and published them to the people. The concealment was ridiculous: but the establishment of some standard was undoubtedly necessary to fix the true state of a question of right; lest, in a long and arbitrary process, it might be shifted continually, and be at length no longer discernible. Or, as Cicero expresses it, "sunt jura, sunt formulæ, de omnibus rebus constitutæ, ne quis aut in genere injuriæ, aut in ratione actionis, errare possit. Expressæ enim sunt ex uniuscujusque damno, dolore, incommodo, calamitate, injuria, publicæ à prætore formulæ, ad quas privata lis accommodatur." And in the same manner Bracton, speaking of the original writs upon which all our actions are founded, declares them to be fixed and immutable, unless by authority of parliament. And all the modern legislators of Europe have found it expedient, from the same reasons, to fall into the same or a similar method. In England, the several suits, or remedial instruments of justice, are, from the subject of them, distinguished into three kinds; actions *personal*, *real*, and *mixed*.

Personal actions are such whereby a man claims a debt, or personal duty, or damages in lieu thereof; and likewise whereby a man claims a satisfaction in damages for some injury done to his person or property. The former are said to be founded upon contracts, the latter upon *torts* or wrongs: and they are the same which the civil law calls "actiones in personam, quæ adversus eum intenduntur qui ex contractu vel delicto obligatus est aliquid dare vel concedere." Of the former nature are all actions upon debt or promises; of the latter are all actions of trespasses, nuisances, assaults, defamatory words, and the like.

Real actions (or, as they are called in the Mirror, *feodal actions*), which concern real property only, are such whereby the plaintiff, here called the *demandant*, claims title to have any lands or tenements, rents, commons, or other hereditaments, in fee-simple, fee-tail, or for term of life. By these actions formerly all disputes concerning real estates were decided; but they are now pretty generally laid aside in practice, upon account of the great nicety required in their management, and the inconvenient length of their process; a much more expeditious method of trying titles being since introduced, by other actions personal and mixed.

Mixed actions are suits partaking of the mixture of the other two, wherein some real property is demanded, and also personal damages for a wrong sustained. As for instance, an action of waste: which is brought by him who hath the inheritance, in remainder or reversion, against the tenant for life, who hath committed waste therein, to recover not only the land wasted, which would make it merely a real action; but also treble damages, in pursuance of the statute of Gloucester, which is a personal recompense; and so both, being joined together, denominate it a *mixed action*.

The orderly parts of a suit are these: 1. The original writ. Lord's court. 2. Suit-covenant, where a person has covenanted to do service in the court of the lord. 3. Suit custom, which is where one and his ancestors have owed suit time out of mind. 4. It is used for a petition to the king or any person.

To Suit. *v. a.* (from the noun.) 1. To fit; to adapt to something else (*Shakspeare*). 2. To be fitted to; to become (*Dryden*). 3. To dress; to clothe (*Shakspeare*).

To Suit. *v. n.* To agree; to accord (*Dryden*).

SUI'TABLE. *a.* (from *suit.*) Fitting; according with; agreeable to (*Tillotson*).

SUI'TABLENESS. *s.* (from *suitable.*) Fitness; agreeableness (*Glanville*).

SUI'TABLY. *ad.* (from *suitable.*) Agreeably; according to (*South*).

SUI'TER. Sui'tor. *s.* (from *suit.*) 1. One that sues; a petitioner, a supplicant (*Hooker. Rowe*). 2 A wooer; one who courts a mistress (*Wotton*).

SUI'TRESS. *s.* (from *suiter.*) A female supplicant (*Rowe*).

SUKOTYRO, in zoology, a genus of the class mammalia, order bruta. Horn on each side near the eyes. One species only, S. Indicus, or Indian sukotyro, with an upright short narrow mane, reaching from the top of the head to the rump. Snout like a hog's, truncate; ears long, rough; tail thick, bushy; eyes placed upright in the head; hoofs four; skin smooth, without plaits.

This, according to Niewhoff, its only describer, is in size as large as an ox; the horns are like teeth, not quite so thick as the tusks of the elephant; a thick, clumsy animal, that feeds upon herbage, and is but seldom taken. It is a native of Java, and called by the Chinese agreeably to the name here given. See Nat. Hist. Pl. CLXXX.

SULCATE. (*sulcus*, a furrow.) In botany, applied to the stem and culm. A furrowed, grooved or fluted stem or culm. Scored with deep broad channels longitudinally. Applied also to succulent leaves.

SULCUS. A groove or furrow; generally applied to the bones.

SULL. *s.* A plough (*Ainsworth*).

SU'LLEN. *a.* 1. Gloomy; angry; sluggishly discontented (*Clarendon*). 2. Mischievous; malignant (*Dryden*). 3. Intractable; obstinate (*Tillotson*). 4. Gloomy; dark; cloudy; dismal (*Pope*). 5. Heavy; dull; sorrowful.

SU'LLENLY. *ad.* (from *sullen.*) Gloomily; malignantly; intractably (*Moore*).

SU'LLENNESS. *s.* (from *sullen.*) Gloominess; moroseness; sluggish anger; malignity; intractability (*Donne*).

SU'LLENS. *s.* (without singular.) Morose temper; gloominess of mind (*Shakspeare*).

SU'LLIAGE. *s.* (*souillage*, Fr.) Pollution; filth; stain of dirt; foulness (*Gov. of Tongue*).

To SU'LLY. *v. a.* (*souiller*, Fr.) To soil; to tarnish; to dirt; to spot (*Roscommon*).

Su'lly. *s.* (from the verb.) Soil; tarnish; spot (*Addison*).

Sully, a town of France, in the department of Loiret, seated on the Loire, 20 miles S.E. of Orleans. Lon. 2. 26 E. Lat. 47. 40 N.

SULLY (Maximilian de Bethune, duke of), was born at Pau, in Bearn, in 1560, and from his childhood became attached to Henry IV. whom he accompanied to Paris, where he applied closely to his studies. He was there at the time of the horrid massacre, but escaped through the kindness of the principal of the college of Burgundy, where he studied. Henry was then no better than a prisoner at the court of France, and Sully, faithful to his master, continued with him, professing also outwardly the catholic religion, but in 1576 the king made his escape while hunting, and Sully was the companion of his flight. However, this prudent minister advised Henry to abjure protestantism, that he might put an end to the miseries of France, and obtain the throne without bloodshed. The famous cardinal Du Perron endeavoured to convert Sully also, but in vain, for he adhered stedfastly to the religion in which he had been bred. He was now the first minister, and he performed all the offices of that high station with the greatest integrity. He attended to every part of the government; prosecuted extortioners, and the embezzlers of the public money; and in short restored the kingdom in a few years from a most desperate, to a most flourishing state. After the murder of his master, Sully retired from court, as he found that new measures were to be adopted with a new reign, and that the courtiers were caballing against him. He spent the remainder of his days in the grandeur of virtue, and died at his castle of Villebon in 1641.

The memoirs of Sully is one of the most interesting works in the French language. It contains a minute history of events from 1570 to 1610; a period most important in the annals of France. The best edition is that of Paris, 3 vols. 4to. or 8 vols. 12mo.

SULMONA, a town of Naples, in Abruzzo Citeriore, with a bishop's see. It was anciently called Solmo, and is remarkable for being the birthplace of Ovid. It is seated on the Sora, 26 miles S.W. of Chieti. Lon. 14. 55 E. Lat. 42. 0 N.

SULPHAS, in medicine, a sulphat or salt formed by a combination of the sulphuric acid with different bases. See SULPHUR. The forms of this chief kind are the following.

S. ALUMINOSUS. Alum. See ALUMIN.

S. AMMONIACÆ. Alkali volatile vitriolatum of Bergman. Sal ammoniacum secretum of Glauber. Vitriolum ammoniacale. This salt has been found native in the neighbourhood of some volcanoes. It is esteemed diuretic and deobstruent, and exhibited in the same diseases as the muriat of ammonia. See AMMONIA MURIATA.

S. CUPRI. Vitriolum cupri. Vitriolum cæruleum. Vitriolum romanum, &c. Cuprum vitriolatum Pharm. Lond. The sulphat of copper possesses acrid and styptic qualities; is esteemed as a tonic, emetic, adstringent, and escharotic, and is exhibited internally in the cure of dropsies, hæmorrhages, and as a speedy emetic. Externally it is applied to stop hæmorrhages, to hæmorrhoids, leucorrhœa, phagedenic ulcers, proud flesh, and condylomata.

S. CUPRI AMMONIACALIS. Cuprum ammoniacale. This preparation of copper posseses adstringent and antiepileptic virtues; with which views it is given internally in the cure of weakness of the primæ viæ, intermittents, and hysterical affections.

S. FERRI. See FERRUM VITRIOLATUM.

S. HYDRARGYRI. See HYDRARGYRUS VITRIOLATUS.

S. MAGNESIÆ. See MAGNESIA VITRIOLATA.

S. POTASSÆ. See KALI VITRIOLATUM.

S. SODÆ. See NATRON VITRIOLATUM.

S. ZINCI. See ZINCUM VITRIOLATUM and SULPHAT.

SULPHATS. (*sulphas.*) Salts formed by the combination of the sulphuric acid with different bases; as, sulphat of alumin, sulphat of iron, &c. See SULPHUR.

SULPHITS, or SULPHITES. (*sulphis.*) Salts formed by the combination of the sulphureous acid with different bases: as, aluminous sulphite, ammoniacal sulphite, &c. See SULPHUR.

SULPHUR, in mineralogy, a genus of the class inflammables. Yellow, with a shade of green, hard, brittle, becoming electric by friction, insoluble in water; melting and becoming liquid in a low heat, burning with a blue flame and intolerably suffocating vapours, which discharge most vegetable colours; in a higher and continued heat evaporating in the form of vapours: combining with most metals. Six species:

1. S. nativum. Native sulphur. Brimstone. Pure, in an uncombined state. Three varieties.

α. In a state of powder or flowers.

β. Pure and solid, whether of a common form, opake, diaphonous, fibrous, capillary, or crystallized.

γ. Solid, and intermixed with arsenic or other materials, of a reddish colour.

Found in a state of solution in the numerous sulphur-waters of Europe, and sometimes deposited in a state of powder in the drains through which they run; in a solid state in the mines of Sicily and Naples, &c.; contaminated with arsenic in the neighbourhood of volcanoes, and crystallizable in tables, cubes, four-sided prisms, longitudinally and very finely striate, simple three or six-sided pyramids in Italy, Spain, Norway, and Siberia: it is generally found in small pieces of gypsum, layers of clay, or in lime; lustre a little greasy, and causes double refraction; it does not dissolve in water, but is soluble in fat oils and alkalies; specific gravity 1.990: consists entirely of sulphuric acid and oxygen.

2. S. terreum. Coloured sulphur. Coal-blend. Combined with mould or alumina, which is left behind after deflagration, not producing a disagreeable smell when acids are poured on it. Found frequently in the neighbourhood of volcanoes, especially where animal recrements have lain deposited for a long time, and also in other parts, as in some lakes of Spain and Germany: colour grey or yellow; or, if combined with bituminous earths, brown, blackish, or black: it burns slowly, with a blueish flame, leaving a residuum in proportion to the earthy matter with which it is mixed.

3. S. hepaticum. Liver of sulphur. Hepar of sulphur. Sulphuret of potass. Combined with lime, or potass, which it leaves behind after deflagration, smelling like rotten eggs, either spontaneously, or when acids are poured on it. Found in a state of solution in all sulphur-waters, and is easily detected by its disagreeable smell and taste, and by its readily tarnishing silver, and becoming milky with acids, and black with acetit of lead: it is also, though rarely, found in a state of powder at the bottom of lakes: colour brown, not unlike the liver of animals, but becoming green and even white when exposed to the air; its taste is acid, caustic, and bitter, and it leaves a brown stain on the skin; it converts vegetable blues into green, and soon destroys them: when exposed to a violent heat the sulphur sublimes, and leaves behind the potass or soda in a pure state.

4. S. pyrites. Pyrite. Sulphat of iron. Sulphur pyrite. Sulphureous mundic. Intimately combined with iron, with a metallic splendour, of a straw-yellow colour and common form. Found in every part of the globe, occurring in almost every rock and vein, or forming masses and veins of itself: hard, frequently mouldering, and losing its metallic splendour; opake, brittle, melting with difficulty, and sometimes attracted by the magnet; frequently containing copper, arsenic, or alumina, and breaking into indeterminate fragments, of a somewhat radiated tex-

ture or compact, with a polished reflecting surface, and gradually passing into the crystallized state; not soluble in muriatic acid, but decomposing when in contact with air and moisture, and producing heat and sulphuric acid: like the two following species, strikes fire with steel: it consists of iron ore mineralized by sulphur: specific gravity from 3.440 to 4.789.

5. S. figuratum. Figured pyrite. Sulphuret of iron. Sulphureous mundic. Intimately combined with iron, with a metallic splendour, of a gold-yellow colour, and more or less rounded form. Found very commonly in mines of argillaceous marl, of a more or less globular form, or hemispherical, ovate, kidney-form, stalactitical, and assuming various fanciful representations, as cones, fruit, mushrooms, shrubs, &c.

6. S. marcasita. Sulphur pyrite. Sulphuret of iron. Intimately combined with iron, with a metallic splendour, of a gold-yellow colour, in the form of crystals. Three varieties.

- α. Pyramidal, the pyramid three-sided, perfect, or the margins truncate.
- β. Crystallized in cubes, the faces convex, flat, smooth, or striate.
- γ. Crystallized in capillary prisms, six, eight, or twelve-sided, and more frequently disposed in a stellate than a parallel manner.

Found very commonly among coals and schistous rocks, and in mines; it was formerly cut and polished by lapidaries, and shaped into buttons and other ornaments: specific gravity from 4.1006 to 4.7491. (*Sowerby.*)

The sulphur of commerce is either such as is found ready formed, or such as is extracted from copper or iron pyrites. Of late it has been asserted, that sulphur is often separated during the putrefaction of animal and vegetable matter, and even that it has been extracted from them by chemical means. Sulphur, till within these few years, was thought to be a compound body, the constituent parts of which were said to be vitriolic acid and phlogiston; but it can now be demonstrated by experiment, that sulphur is a simple body, which, during combustion, or, in other words, during its combination with oxygen, produces sulphuric acid. It is a medicine in frequent use in cutaneous diseases, in hæmorrhoids, scurvy, ulcers of the legs, tinea, &c. and is the only specific against the itch. Sulphur is separated from its impurities by sublimation, when it is called flores sulphuris, and the remaining dross sulphur vivum. Sulphur combined with alkalis, lime, and the oxyds of mercury, forms the following sulphurets: with potass or soda, the kali sulphuratum or hepar sulphuris; see SULPHURETUM POTASSÆ: with ammonia, the volatile sulphuret of ammonia, hepar sulphuris volatile; see SULPHURETUM AMMONIACÆ: with lime, the sulphuret of lime, hepar calcis; see SULPHURETUM CALCIS: with the black oxyd of mercury per se, it forms what is commonly called æthiops mineral; see SULPHURETUM HYDRARGYRI NIGRUM: with the red oxyd, cinnabar; see SULPHURETUM HYDRARGYRI RUBRUM: with black stibiated quicksilver, æthiops antimonial; see SULPHURETUM HYDRARGYRI STIBIATUM NIGRUM: and with the red stibiated quicksilver, the red cinnabar of antimony; see SULPHURETUM HYDRARGYRI STIBIATUM RUBRUM. Sulphur unites with the oxyds of antimony, and forms kermes mineral; see HYDRO-SULPHURETUM STIBII RUBRUM: see also HYDRO-SULPHURETUM STIBII LUTEUM, and ANTIMONY. These, with a wine, syrup, &c. are the principal combinations of sulphur used in medicine. For the virtues of the different sulphurets, see their respective heads.

Sulphur by friction acquires the resinous electricity; the transparent crystals are in a high degree doubly refractive. It is found sometimes, though rarely, in veins in primitive mountains; its common repository is in beds of secondary gypsum, where it occurs principally in nodules; it is occasionally met with also in beds of indurated marl and compact limestone.

In England a large quantity of sulphur is obtained, at a small expense, from the pyritical copper ore, during the roasting which this undergoes previous to the process of smelting. At the celebrated Parys mine in Anglesey works for this purpose are constructed on a large scale. At the foot of a low but steep ridge of rocks are constructed masses of masonry not unlike high blast furnaces, except that the top is capped with a dome of brick-work, from which proceeds a horizontal flue, about the size of a common chimney, which terminates in a square or oblong brick chamber, built at the top of the rock. Some lighted fuel is introduced by means of a door in the dome of this roasting furnace, and a few baskets full of ore, broken into moderately small pieces, are thrown on it, fresh parcels of ore being added from time to time as the succeeding parcels get lighted: a sufficiency of air for the slow combustion required in this process is let in by means of a door at the bottom of the kiln, which also serves to take out the ore by, when properly roasted; that part of the sulphur which escapes combustion rises in vapour, and collects in the dome (the door of which is only opened to admit fresh charges of air), whence it passes through the flue into the chamber, where it presently concretes, lining the sides and roof; each chamber has a door, by means of which, about once in six weeks, it is cleared of the sulphur. This rough sulphur is in spongy pulverulent crusts, of a dirty greyish yellow colour. For its purification it is melted in a boiler, the impurities are got rid of by scumming and subsidence, and the fluid mass is then ladled into cylindrical moulds to form the common roll sulphur or brimstone, or into cones about two feet high, forming the loaves of sulphur. It is the impure dregs of this preparation which are sold in the shops under the name of sulphur vivum.

Besides the common sulphur, there are two other forms in which this substance appears in commerce; the sublimed, or flowers of sulphur, as we have already hinted at; and the precipitated, or magistery of sulphur, at one time known under the name of lac sulphuris, or milk of sulphur.

The first is prepared in the laboratory, by heating in a sand bath an earthen cucurbit charged with roll sulphur, and surmounted with a set of aludels; at a gentle heat the sulphur first melts, then rises in vapour, and concretes within the aludels in the form of a glittering yellow powder, which, when examined by a microscope, appears to be composed of minute crystals. Flowers of sulphur are made in the large way by conducting the vapour of melted sulphur into close chambers instead of aludels, and being prepared with less care, it is often inferior in purity to that obtained by the former method. Flowers of sulphur, however, in whatever manner prepared, are more or less acidulous from a mixture of sulphureous acid, on which account an infusion of them in water reddens tincture of litmus. This acid, however, may be easily got rid of by washing the powder first with a warm and very dilute solution of pearlash, and then with two or three successive parcels of warm water.

Magistery of sulphur is prepared by decomposing by the sulphuric, or any other acid, a solution of alkaline sulphuret: when a copious white precipitate falls down, which is to be thoroughly edulcorated with successive portions of warm water. Sulphur in this form has a dull earthy appearance, owing to its extremely minute state of division; it is of a yellowish white colour, smooth, and almost unctuous to the touch; by exposure to light it acquires a yellow colour. It is generally looked upon as the purest form of sulphur, yet, from some of its properties, and the mode in which it is prepared, there is reason for suspecting that a portion of hydrogen enters into its composition.

Sulphur has hitherto been regarded a simple undecompounded substance; but sir Humphry Davy has succeeded in decompounding it in the small way by means of the voltaic circuit. He has fully proved the existence of oxygen and hydrogen in it; that it is of a resinous and oily nature, and contains, independently of hydrogen and oxygen (both which, however, are but in small quantity), a large portion of carbonaceous matter producing the acidifiable basis.

The chief chemical compounds of this substance are,

Sulphurets
Hydrosulphurets
Sulphuric acid
Sulphurous acid
Sulphites
Sulphats.

Sulphurets are combinations of sulphur with alkaline, earthy, and metallic bases. Those with an alkaline base were formerly called livers of sulphur. All these only exist in a concrete state, as when dissolved in water a decomposition takes place. We may notice, as an example, the sulphuret of potash, which is formed by exposing to heat in a covered crucible equal weights of sulphur and the dry concrete alkali. When it has become concrete, it is firm and brittle, and of a reddish brown colour, which, from its resemblance to the liver of an animal, obtained the name of hepar sulphuris, liver of sulphur. This substance, while dry, is inodorous, but when moistened, it acquires a fetid smell from the production of sulphuretted hydrogen. It fuses when exposed to a strong heat. A singular property belonging to this substance is, that when fused with some metals, as gold, a combination is formed, which is soluble in water.

The metallic sulphurets are extremely common, and constitute those kinds of ore which were formerly denominated pyrites: see the article PYRITES.

Besides these, sulphur also combines with the simple inflammables, as carbon, phosphorus, and hydrogen, which are denominated sulphurets of these substances where the sulphur predominates, but carburets, phosphorets, and hydrogurets of sulphur, where it forms the smallest constituent part.

It is only of late that sulphur has been proved to combine with carbon; the fact was established by experiments of Messrs. Desormes and Clement, and is thus announced: fill a porcelain tube with charcoal, and make it pass through a furnace in such a way that one end shall be considerably elevated above the other. To the lower extremity lute a wide glass tube of such a length and shape, that its end can be plunged to the bottom of a bottle of water. To the elevated extremity lute another glass tube filled with small bits of sulphur, and secured at the further end, so that the sulphur may be pushed forward by means of a wire, without allowing the inside of the tube to communicate with the external air. Heat the porcelain tube, and consequently the charcoal which it contains, to redness, and continue the heat till air-bubbles cease to come from the charcoal: then push the sulphur slowly, and piece after piece into the porcelain tube. A substance passes through the glass tube, and condenses under the water of the bottle into a liquid, which, according to them, is carburet of sulphur.

This liquid is transparent and colourless when pure, but very frequently it has a greenish yellow tinge. Its taste is cooling and pungent, and its odour strong and peculiar. Its specific gravity is 1.3. It burns like spirit of wine, and emits a sulphureous odour; sulphur is deposited, and charcoal remains behind. When a little of it is put into a bottle filled with oxygen gass, it gradually mixes with the oxygen, and assumes the gasseous form. If a burning taper be applied to the mouth of the bottle, the mixture burns instantaneously, and with an explosion so violent as to endanger the vessel. It dissolves phosphorus readily; it dissolves also a small portion of sulphur, but has no action on charcoal.

Sulphur and phosphorus readily combine with each other, as was first ascertained by Marcgraf, and has since been ascertained by many other chemists. All that is necessary is to mix the two substances together, and apply a degree of heat sufficient to melt them. The compound has a yellowish white colour, and a crystallized appearance.

Hydrosulphurets. Sulphuretted hydrogen.—When sulphur combines with hydrogen, which it does very readily, as these two substances have a close affinity for each other, the result is neither a liquid nor a solid, but a gass. There are various proportions and various modes in which they unite either with themselves or other substances. The following is a brief sketch of them:

1. Sulphuretted hydrogen gass, or hepatic air; the hydrothionic acid of the Germans. This consists of hydrogen holding sulphur in solution, and when uncombined with a base uniformly presents a gasseous form. It is heavier than common air, according to Kirwan, in the proportion of 10.000 to 90.38, so that 100 cubic inches weigh about 35 grains. It is readily absorbed by water, and in considerable quantity, according to Kirwan to the amount of about three-fourths of its bulk: a combination which is found native in many springs, as those of Harrowgate and Moffatt, which are easily ascertained at first from the strong fetid smell which it communicates. It combines readily also with metals, alkalies, and earths, forming metallic, alkaline, and earthy hydrosulphurets.

Sulphuric acid.—Oil of vitriol. Vitriolic acid. Sulphuric acid consists of sulphur, which constitutes its basis, and of oxygen. It frequently occurs in combination with alkalies, earths, and metals; but seldom in a state of purity, and whether at all has been doubted. For chemical, medical, and other purposes, it is obtained by the rapid combustion of sulphur, and the decomposition of metallic and earthy sulphuric acid salts by fire. If melted sulphur be exposed in open air to an increased heat, it takes fire, is entirely consumed, and burns with a flame, and an acid suffocating vapour. The sulphur is, by this combustion, changed to an acid. If the heat by which burning sulphur is consumed be only weak, its flame is blue, and the acid then generated is imperfect, very volatile, and aëriform. This imperfect sulphuric acid is called sulphureous acid. But if the heat be stronger, the flame of the sulphur is white and lively, and a perfect sulphuric acid in the vaporous state is formed. The sulphuric acid may be obtained by different methods: that prepared in England is by the combustion of sulphur; for which purpose peculiar apartments, with their insides lined with lead, are constructed, in order to enclose the burning sulphur. But because the sulphur would in that situation be soon extinguished, and never burn with due vivacity, about the eighth part of its weight of nitre is mingled with it to supply vital air, without which no combustion can exist. Both the water at the bottom of the chamber, and also the aqueous vapours conveyed into it, imbibe the sulphuric acid as it forms. The weak or diluted acid thus obtained is collected and concentrated by evaporating the superfluous water in glass vessels. Sulphuric acid, concentrated in this manner, is sold under the name of English oil of vitriol, oleum vitrioli, to distinguish it from another species, called Saxon oil of vitriol, which is obtained from green vitriol by distillation. Every kind of concentrated sulphuric acid, formerly found in commerce, was prepared by distillation from green vitriol, or copper: and it is on this account that the sulphuric acid is generally called vitriolic acid. Oil of vitriol is a very strong acid, burns and corrodes the skin. When pure, it has neither colour nor smell, but is very apt to turn more or less brown, and of a sulphureous odour, by combustible, animal, and vegetable matter, as is usually the case with what is sold in the shops. If sulphuric acid be highly concentrated, it congeals at a temperature of 150°, and becomes a crystalline mass, formerly termed glacial oil of vitriol. Mixed with water it becomes hot, and is then termed spirit of vitriol.

The acid which is obtained in this way is very weak, for it is diluted with the water in which it was condensed, which water may be separated by distillation. Even after this it is usually contaminated with a little lead from the vessels, some potass, and sometimes nitric and sulphurous acids. To obtain it perfectly pure, the sulphuric acid of commerce must be distilled. This process is conducted by putting a quantity of the acid into a retort, and exposing it to a degree of heat sufficient to make it boil. The beak of the retort is put into a receiver, in which the acid, as it comes over, is condensed. The acid thus purified is a transparent colourless liquid, of an oily consistence. It has no smell, but a strong acid taste. It destroys all animal and vegetable substances. It reddens all vegetable blues. It always contains water. When this is driven off by a moderate heat, the acid is said to be concentrated. When as much concentrated as possible, the specific gravity is 2, or double that of water; but it can rarely be obtained of greater density than 1.8. The sulphuric acid suffers no change from being exposed to the light. It boils at the temperature of 546°, or, according to Bergman, 540°. When this acid is deprived of its caloric, it is susceptible of congelation, and even of crystallization, in flat, six-sided prisms, terminating in a six-sided pyramid. It crystallizes most readily, when it is neither too much concentrated, nor diluted with water. Of the specific gravity of 1.6 it crystallizes at the temperature of a few degrees below the freezing point of water. Of the specific gravity of 1.8, it resists the greatest degree of cold. Chaptal observed it crystallize at the temperature of 48°, and Mr. Keir found that it froze at 45° of the specific gravity of 1.78. Sulphuric acid has a strong attraction for water.

In some experiments that have been made, sulphuric acid, when exposed to the atmosphere, attracted above six times its weight of water. When four parts of concentrated sulphuric acid, and one part of ice at the temperature of 32°, are mixed together, the moment they come in contact the ice melts, and the temperature rises to 212°. A greater quantity of caloric is given out when the two bodies are mixed together in the liquid state. If four parts of the acid and one of water are suddenly mixed together, the temperature of the mixture rises to about 300°. This extrication of caloric, it is obvious, arises from the sudden condensation of the two liquids, the medium bulk of which is considerably less than the two taken together. So great is the attraction of this acid for water, that the strongest that can be prepared can scarcely be supposed to be entirely free from it. Attempts have been made to determine the proportion of oxygen and sulphur, which enter into the composition of sulphuric acid. According to the experiments of Lavoisier, in which he measured the quantity of oxygen absorbed, by a given weight of sulphur during combustion, the proportions are,

Sulphur - - - - -	71
Oxygen - - - - -	29
	100

But other methods have been adopted. These are, by decomposing other substances which contain oxygen, by means of sulphur. According to the experiments of M. Chenevix, conducted in this way, the sulphuric acid consists of,

Sulphur - - - - -	61.5
Oxygen - - - - -	38.5
	100.0

Sulphuric acid does not combine with oxygen, nor has it any action with azotic gass. It appears that hydrogen has a greater affinity for oxygen than the sulphur has, and therefore the sulphuric acid is decomposed by means of hydrogen gass. In the cold there is no action between hydrogen gass and sulphuric acid; but if they are made to pass through a red hot porcelain tube, the acid is decomposed, water is formed, and sulphur is precipitated. When hydrogen gass is employed in a greater proportion than the half of the acid, the superabundant gass dissolves the sulphur, and is disengaged in the form of sulphurated hydrogen gass. Charcoal has no action on sulphuric acid in the cold; but, at the boiling temperature, it decomposes it, and converts it into sulphurous acid. If a piece of red hot charcoal be immersed in a quantity of concentrated sulphuric acid, part of the acid is suddenly disengaged under the form of thick white fumes, accompanied with sulphurous acid gass. The sulphuric acid is decomposed; part of its oxygen is attracted by the charcoal, forming carbonic acid, and thus it is reduced to the lowest proportion of oxygen, in the state of sulphurous acid. A similar effect is produced by phosphorus. Phosphorus, with the assistance of heat, partially decomposes the sulphuric acid, by abstracting part of its oxygen. Phosphoric acid is formed, and sulphurous acid driven off. In the cold, sulphur has no action on sulphuric acid; but, when they are boiled together, the sulphur is partly dissolved in the acid, and converts it into sulphurous acid. The sulphur which has been added combines with the oxygen, which is necessary for the constitution of sulphuric acid, and thus the whole is converted into sulphurous acid. Sulphuric acid combines with alkalies, the earths and the metals forming salts; which, in the present language of chemistry, are denominated sulphates. This acid is employed in great quantity in many arts and manufactures. It is employed also in medicine and pharmacy; the preparation of it, therefore, has long been an object of considerable importance.

As an article of manufacture and commerce, sulphuric acid holds a very high rank; and the means of preparing, and more especially of determining its strength, is of pre-eminent importance. We have hence thought it expedient to subjoin from the Phil. Mag. vol. xi. p. 161. Mr. Parkes's very valuable table upon this subject, drawn up for general use, not from purified sulphuric acid, but from a good sample of common acid obtained in the usual way.

"When I began the experiment," says he, "the atmosphere of the room was at 60°, and the acid was of the specific gravity of 1.8494, which, at this temperature, is as strong as it is ever sold.

"In order to form the annexed table, I proceeded as follows:

"I first accurately weighed 10,000 grains of this acid into a stoppered bottle of glass, and then added to it 100 grains of pure water. When the mixture was become cool, after having been sufficiently agitated, the specific gravity of it was taken, and the result forms the first line of the table. In this way I continued to dilute the acid with successive portions of water, taking care to let it rest a sufficient time between each addition of the water, that a complete union between the acid and the water might take place; having found by experiment that a mixture of sulphuric acid and water, even after it has become cold, requires several hours for it to arrive at the maximum of condensation. I took also the precaution of keeping it in stoppered bottles, that it might not imbibe water from the atmosphere, and frequently agitated it during each interval. And, in order to attain as great accuracy as possible, I procured a gravity bottle larger than usual, one that holds nearly ten ounces of water, and with a stem so small, that, at the part to which the fluid rises when properly filled, a single drop of the liquor will occasion a rise of nearly one sixteenth of an inch.

"The balance which I made use of in these experiments is so delicate, that it will turn with the 20th part of a grain; and as the acids will erode the common scale dishes, if dropped upon them, and endanger the accuracy of a result, I have long been in the habit of using those made with Wedgwood's ware, and such were employed in making this table. Those parts of the table which have a star opposite to them were made by actual experiment—the intermediate ones were the results of calculation.

"Since I concluded these experiments, it occurred to me, that it might be useful to some manufacturers to know the quantity of acid per cent. in diluted acid of any given strength; I have, therefore, calculated the quantity in each, and annexed it. The column of ounces and drachms is added for the use of those who are accustomed to this mode of reckoning, and also for those who are not conversant with the usual method of stating specific gravities; and is calculated on the supposition of the wine pint holding exactly sixteen ounces avoirdupois of pure water.

"The sulphuric acid which is consumed in these kingdoms amounts, I believe, to upwards of 3000 tons annually; the greater part of which is used in a state of dilution. For the purposes of dissolving iron or zinc, it should be diluted with at least five or six times its weight of water. Sulphuric acid is consumed in large quantities by bleachers, for making the oxymuriate of lime, and these people always use it in a state of dilution. The calico printers also expend large sums in the purchase of this acid, which they use in various states of dilution, for making what they call sours.

"To these, and other manufacturers, this table will be of use, not only in assisting them in the formation of acid of any given strength, but it will enable them at any time to ascertain whether their servants have observed due care in making the different preparations; which is a matter of great moment—for it often happens, that for want of this the printer and manufacturer suffer great loss, and the goods sustain an irreparable injury.

"I need scarcely add that the oil of vitriol makers themselves may also derive great benefit from attending to this table.

A Table of the Specific Gravities of Sulphuric Acid, when diluted with different Portions of Water, at the Temperature of 60°.

	Drachms of Water.	Specific Gravity.	Weight of the Wine Pint.		Acid per Cent.
			Oz.	Drms.	
100 Drachms Sulp. Acid. Sp. Grav. 1·8494, Or, 29 oz. 9¼ Drachms, the Weight, Avoirdupois, of the Wint Pint.	* 1	1·8484	29	9¼	99·009
	* 2	1·8465	29	8¾	98·039
	* 3	1·8445	29	8¼	97·087
	* 4	1·8416	29	7½	96·153
	* 5	1·8387	29	6¾	95·238
	6	1·8358	29	6	94·339
	* 7	1·8319	29	5	93·457
	8	1·8270	29	3¾	92·509
	9	1·8222	29	2½	91·743
	*10	1·8163	29	1	90·909
	11	1·8104	28	15½	90·090
	12	1·8046	28	14	89·285
	13	1·7988	28	12½	88·495
	14	1·7929	28	11	87·719
	*15	1·7880	28	9¾	86·956
	16	1·7821	28	8	86·206
	17	1·7744	28	6¼	85·470
	18	1·7666	28	4¼	84·745
	19	1·7588	28	2¼	84·033
	20	1·7510	28	0¼	83·333
	*21	1·7431	27	14¼	82·644
	22	1·7353	27	12¼	81·967
	23	1·7275	27	10¼	81·300
	24	1·7207	27	8½	80·645
	25	1·7138	27	6¾	80·000
	26	1·7070	27	5	79·365
	*27	1·7002	27	3¼	78·740
	28	1·6933	27	1½	78·125
	29	1·6865	26	15¾	77·519
	30	1·6796	26	14	76·923
	31	1·6728	26	12¼	76·335
	32	1·6660	26	10½	75·757
	*33	1·6582	26	8½	75·187
	34	1·6523	26	7	74·626
	35	1·6464	26	5½	74·074
	36	1·6406	26	4	73·529
	37	1·6348	26	2½	72·992
	38	1·6289	26	1	72·463
	39	1·6230	25	15½	71·942
	*40	1·6171	25	14	71·428
	41	1·6113	25	12½	70·921
	42	1·6054	25	11	70·422
	43	1·5995	25	9½	69·930
	44	1·5937	25	8	69·444
	*45	1·5879	25	6½	68·965
	46	1·5820	25	5	68·493
	47	1·5761	25	3½	68·027
	48	1·5703	25	2	67·567
	49	1·5645	25	0½	67·114
	50	1·5585	24	15	66·666
	51	1·5526	24	13½	66·225
	52	1·5478	24	12¼	65·789
	53	1·5429	24	11	65·359
	*54	1·5390	24	10	64·935
	55	1·5351	24	9	64·516
	56	1·5312	24	8	64·102
	57	1·5273	24	7	63·694
	58	1·5234	24	6	63·291
	59	1·5195	24	5	62·893
	60	1·5156	24	4	62·500
	61	1·5117	24	3	62·111
	*62	1·5078	24	2	61·728
	63	1·5039	24	1	61·349

SULPHUR.

	Drachms of Water.	Specific Gravity.	Weight of the Wine Pint.		Acid per Cent.
			Oz.	Drms.	
100 Drachms Sulp. Acid. Sp. Grav. 1·8494, Or, 29 oz. 9½ Drachms, the Weight, Avoirdupois, of the Wine Pint.	64	1·5000	24	0	60·975
	65	1·4960	23	15	60·606
	66	1·4921	23	14	60·240
	67	1·4882	23	13	59·880
	68	1·4843	23	12	59·523
	69	1·4804	23	11	59·171
	*70	1·4765	23	10	58·823
	71	1·4726	23	9	58·481
	72	1·4687	23	8	58·139
	73	1·4648	23	7	57·803
	74	1·4609	23	6	57·471
	75	1·4570	23	5	57·142
	76	1·4531	23	4	56·818
	77	1·4502	23	3¼	56·497
	*78	1 4473	23	2½	56·179
	79	1·4433	23	1½	55·865
	80	1·4395	23	0½	55·555
	81	1·4365	22	15¾	55·248
	82	1·4336	22	15	54·945
	83	1·4306	22	14¼	54·644
	84	1·4276	22	13½	54·347
	85	1·4257	22	12¾	54·054
	*86	1·4218	22	12	53·763
	87	1·4189	22	11¼	53·475
	88	1·4160	22	10½	53·191
	89	1·4130	22	9¾	52·910
	90	1·4101	22	9	52·631
	91	1·4072	22	8½	52·356
	92	1·4042	22	7½	52·083
	93	1·4013	22	6¾	51·813
	*94	1·3984	22	6	51·546
	95	1·3955	22	5¼	51·282
	96	1·3926	22	4½	51·020
	97	1·3906	22	4	50·761
	98	1·3886	22	3½	50·505
	99	1·3867	22	3	50·256
	*100	1·3848	22	2½	50·000
	105	1·3730	21	15½	48·780
	*110	1·3632	21	13	47·619
	115	1·3535	21	10½	46·511
	*120	1·3437	21	8	45·454
	125	1·3359	21	6	44·444
	*130	1·3281	21	4	43·478
	135	1·3203	21	2	42·553
	*140	1·3125	21	0	41·666
	145	1·3056	20	14¼	40·816
	*150	1·2988	20	12½	40·000
	155	1·2919	20	10¾	39·215
	* 160	1·2851	20	9	38·461
	165	1·2783	20	7¼	37·735
	170	1·2724	20	5¾	37·037
	175	1·2676	20	4½	36·363
	*180	1·2627	20	3¾	35·714
	185	1·2568	20	1¾	35·087
	190	1·2520	20	0½	34·482
	195	1·2470	19	15¼	33·898
	*200	1·2421	19	14	33·333
	210	1·2343	19	12	32·258
	*220	1·2265	19	10	31·250
	230	1·2187	19	8	30·303
	*240	1·2129	19	6½	29·411
	250	1·2060	19	4¾	28·571
	*260	1·1992	19	3	27·777
	270	1·1933	19	1½	27·027
	*280	1·1875	19	0	26·315
	290	1·1825	18	14¾	25·641
	*300	1·1776	18	13½	25·000
	310	1·1728	18	12¼	24·390

	Drachms of Water.	Specific Gravity.	Weight of the Wine Pint.		Acid per Cent.
			Oz.	Drms.	
100 Drachms Sulp. Acid. Sp. Grav. 1·8494, Or, 29 oz. 9½ Drachms, the Weight, Avoirdupois, of the Wine Pint.	320	1·1679	18	11	23·809
	330	1·1630	18	9¾	23·255
	*340	1·1582	18	8½	22·727
	350	1·1552	18	7¾	22·222
	360	1·1523	18	7	21·739
	370	1·1494	18	6¼	21·276
	*380	1·1464	18	5½	20·833
	390	1·1426	18	4½	20·408
	400	1·1338	18	2¼	20·000
	*420	1·1328	18	2	19·230
	440	1·1279	18	0¾	18·518
	*460	1·1240	17	15¾	17·857
	480	1·1181	17	14¼	17·241
	*500	1·1132	17	13	16·666
	*550	1·1054	17	11	15·384
	*600	1·0966	17	8¾	14·285
	*650	1·0898	17	7	13·333
	*700	1·0839	17	5½	12·500
	*750	1·0781	17	4	11·764
	*800	1·0732	17	2¾	11·111
	*850	1·0693	17	1¾	10·526
	*900	1·0664	17	1	10·000
	*950	1·0625	17	0	9·523
	*1000	1·0602	16	15½	9·090
	*1100	1·0546	16	14	8·333
	*1200	1·0507	16	13	7·692
	*1300	1·0488	16	12½	7·142
	*1400	1·0458	16	11¾	6·666
	*1500	1·0429	16	11	6·250
	1600	1·0390	16	10	5·882
	1700	1·0370	16	9½	5·555
	*1800	1·0351	16	9	5·263
	1900	1·0337	16	8⅝	5·000
	*2000	1·0322	16	8¼	4·761
	*2250	1·0283	16	7¼	4·255
	*2500	1·0254	16	6½	3·846
	*2750	1·0234	16	6	3·508
	*3000	1·0214	16	5½	3·225
	*3500	1·0185	16	4¾	2·777
	*4000	1·0166	16	4¼	2·439
	*4500	1·0146	16	3¾	2·173
	*5000	1·0127	16	3¼	1·960
	5500	1·0117	16	3	1·785
	*6000	1·0107	16	2¾	1·639
	6500	1·0102	16	2⅝	1·515
	*7000	1·0098	16	2½	1·408
	7500	1·0093	16	2⅜	1·315
	*8000	1·0088	16	2¼	1·234
	8500	1·0083	16	2⅛	1·162
	*9000	1·0078	16	2	1·098
	9500	1·0073	16	1⅞	1·041
	*10000	1·0068	16	1¾	0·990

Sulphurous acid.—Acidum sulphurosum. Phlogisticated vitriolic acid. Volatile sulphuric acid. Sulphureous acid. Volatile acid of vitriol. Sulphur is capable of being oxygenated in different degrees. In the sulphuric acid it is saturated, or nearly saturated, with oxygen, and is therefore reckoned a perfect acid. With a smaller portion of oxygen it exhibits an acid of a different nature and of different properties, which ought to be regarded as an imperfect sulphuric acid, and to which we give the name of sulphureous acid. This sulphureous acid is obtained by slow combustion of sulphur, when it burns only with a blue flame. The acid generated by this process is of much less acidity than sulphuric acid, and it is at the same time exceedingly volatile, as it is apparent from the very suffocating smell issuing from the combustion, and even assuming the aërial form if moisture is excluded.

Though some of the properties of this acid must have been known in the remotest ages, as it is always formed during the slow combustion of sulphur, Stahl was the first chemist who examined it, and pointed out its peculiar nature. His method of procuring it was to burn sulphur at a low temperature, and expose to its flames cloth dipped in a solution of potass. By this method he obtained a combination of potass and sulphurous acid; for, at a low temperature, sulphur forms by combustion only sulphurous acid. Scheele pointed out, in 1771, a method of procuring sulphurous acid in quantities. Dr. Priestley, in 1774, obtained it in the gasseous form, and examined its properties while in a state of purity.

1. Sulphurous acid may be procured by the following process: Put into a glass retort two parts of sulphuric acid and one part of mercury, and apply the heat of a lamp; the mixture effervesces, and a gass issues from the beak of the retort, and may be received in glass jars filled with mercury, and standing in a mercurial trough. This gass is sulphurous acid.

2. Sulphurous acid, in the state of gass, is colourless and invisible like common air. It is incapable of maintaining combustion; nor can animals breathe it without death. It has a strong and suffocating odour, precisely the same with that exhaled by sulphur burning with a blue flame: sulphur, by such a combustion, being totally converted into a sulphurous acid. Its specific gravity, according to Bergman, is 0.00246; according to Lavoisier, 0.00251. It is therefore somewhat more than twice as heavy as air. One hundred cubic inches of it weigh nearly 63 grains.

3. This acid reddens vegetable blues, and gradually destroys the greater number of them. It exercises this power on a great variety of vegetable and animal colours. Hence the use of the fumes of sulphur in bleaching wool and in whitening linen stained by means of fruits.

4. Dr. Priestley discovered, that when a strong heat is applied to this acid in close vessels, a quantity of sulphur is precipitated, and the acid is converted into sulphuric. Berthollet obtained the same result; but Fourcroy and Vauquelin could not succeed.

5. Water absorbs this acid with avidity. According to Dr. Priestley, 1000 grains of water, at the temperature 54.5°, absorb 39.6 grains of this acid. Fourcroy, on the other hand, affirms that water at 40° absorbs the third of its weight of sulphurous acid gass. Ice absorbs this gass very rapidly, and is instantly melted. Water saturated with this gass, in which state it is known by the name of liquid sulphurous acid, or sulphurous acid, is of the specific gravity 1.040. It may be frozen without parting with any of the acid gass. When water, which has been saturated with this acid at the freezing temperature, is exposed to the heat of 65.25°, it is filled with a vast number of bubbles, which continually increase and rise to the surface. These bubbles are a part of the acid separating from it. It freezes a few degrees below 32°.

6. When liquid sulphurous acid is exposed to atmospheric air or to oxygen gass, it gradually combines with oxygen, and is converted into sulphuric acid. This change takes place more completely if the acid is combined with an alkali or earth. When a mixture of sulphurous acid gass and oxygen gass is made to pass through a red hot porcelain tube, the two bodies combine, and sulphuric acid is formed.

7. Of the simple combustibles, sulphur and phosphorus have no action on it whatever; hydrogen gass and charcoal do not alter it while cold, but at a red heat they decompose it completely; water or carbonic acid is formed, and sulphur deposited.

8. Neither azote nor muriatic acid produces any change on it.

9. Sulphurous acid does not seem capable of oxidizing or dissolving any of the metals except iron, zinc, and manganese.

10. It combines with alkalies, earths, and metallic oxyds, and forms salts known by the name of sulphites.

11. Sulphuric acid absorbs this gass in considerable quantity. It acquires a yellowish-brown colour, a penetrating odour, and the property of smoking when exposed to the air. When this mixture is distilled, the first vapour which comes over, and which is a compound of the two acids, crystallizes in long white prisms. This singular compound, formerly known by the name of glacial sulphuric acid, smokes in the air; and when the atmosphere is moist, melts with effervescence. When thrown into water, it hisses like a red iron. It has the odour of sulphurous acid. Fourcroy has lately demonstrated, that this is a compound of sulphuric and sulphurous acids.

12. The affinities of sulphurous acid, as far as they have been investigated, are as follow:

Barytes,
Lime,
Potass,
Soda,
Strontian,
Magnesia,
Ammonia,
Glucina,
Alumina,
Zirconia.

13. As this acid is formed by the combustion of sulphur, it cannot be doubted that it is composed of the same ingredients with sulphuric acid; and as it is evolved from sulphuric acid by the action of sulphur, and likewise by some of the metals, it cannot be doubted that it contains a smaller proportion of oxygen. But no precise set of experiments has yet been made to determine the proportion of its component parts. Fourcroy affirms that it contains

85 sulphur
15 oxygen
100

Sulphats, are salts obtained from combinations of the sulphuric acid with alkalies, earths, or metals.

Sulphites, are salts obtained from combining the sulphurous acid with alkalies, earths, or metals.

SULPHUR. (more properly *Sulphure*. *Souffrière*, Fr.) In geology, a volcanic mountain, common to the islands of the western archipelago of the Atlantic, perpetually throwing forth sulphurous or sulphuric exhalations from fissures or a direct crater; and which exhalations often concrete and form beautiful crystals on the surrounding parts of the mountain. One of the best descriptions we have met with of these sulphur mountains is given by Dr. Nugent, and published as follows in the Transactions of the Geological Society, vol. I.

"On my voyage last year (October 1810) from Antigua to England, the packet touched at Montserrat, and my curiosity having been excited by the accounts I received of a place in the island called The Sulphur, and which, from the descriptions of several persons, I conceived might be the crater of an inconsiderable volcano, I determined to avail myself of the stay of the packet to visit that place.

"The island of Montserrat, so called by the Spaniards from a fancied resemblance to the celebrated mountain of Catalonia, is every where extremely rugged and mountainous, and the only roads, except in one direction, are narrow bridle-paths winding through the recesses of the mountains: there is hardly a possibility of using wheeled carriages, and the produce of the estates is brought to the place of shipment on the backs of mules. Accompanied by a friend, I accordingly set out on horseback from the town of Plymouth, which is situated at the foot of the mountains on the sea shore. We proceeded by a circuitous and steep route about six miles, gradually ascending the mountain, which consisted entirely of an uniform porphyritic rock, broken every where into fragments and large blocks, and which in many places was so denuded of soil as to render it a matter of astonishment how vegetation, and particularly that of the cane, should thrive so well. The far greater part of the whole island is made up of this porphyry, which by some systematics would be considered as referable to the newest floëtz trap formation, and by others would be regarded only as a variety of lava. It is a compact and highly indurated argillaceous rock of a grey colour, replete with large and perfect crystals of white felsper and black hornblende. Rocks of this description generally pass in the West Indies by the vague denomination of fire-stone, from the useful property they possess of resisting the operation of intense heat. A considerable quantity of this stone is accordingly exported from Montserrat to the other islands which do not contain it, being essential in forming the masonry around the copper boilers in sugar-works. We continued our ride a considerable distance beyond the estate called Galloway's (where we procured a guide), till we came to the side of a very deep ravine which extends in a winding direction the whole way from one of the higher mountains to the sea. A rugged horse-path was traced along the brink of the ravine, which we followed, amidst the most beautiful and romantic scenery. At the head of this ravine is a small amphitheatre formed by lofty surrounding mountains, and here is situated what is termed The Sulphur. Though the scene was extremely grand and well worthy of observation, yet I confess I could not help feeling a good deal disappointed, as there was nothing like a crater to be seen, or any thing else that could lead me to suppose the place had any connexion with a volcano. On the north, east, and west sides were lofty mountains wooded to the tops, composed apparently of the same kind of porphyry we had noticed all along the way. On the south, the same kind of rock of no great height, quite bare of vegetation, and in a very peculiar state of decomposition. And on the south-eastern side, our path and the outlet into the ravine. The whole area thus included might be three or four hundred yards in length, and half that distance in breadth. The surface of the ground, not occupied by the ravine, was broken and strewed with fragments and masses of the porphyritic rock, for the most part so exceedingly decomposed as to be friable and to crumble on the smallest pressure. For some time I thought that this substance, which is perfectly white, and in some instances exhibits an arrangement like crystals, was a peculiar mineral; but afterwards became convinced, that it was merely the porphyritic rock singularly altered, not by the action of the air or weather, but, as I conjecture, by a strong sulphureous or sulphuric acid vapour which is generated here, and which is probably driven more against one side by the eddy wind up the ravine, the breeze from any other quarter being shut out by the surrounding hills.

"Amidst the loose stones and fragments of decomposed rock are many fissures and crevices, whence very strong sulphureous exhalations arise, and which are diffused to a considerable distance: these exhalations are so powerful as to impede respiration, and near any of the fissures are quite intolerable and suffocating. The buttons of my coat, and some silver and keys in my pockets, were instantaneously discoloured. An intense degree of heat is at the same time evolved, which, added to the apprehension of the ground crumbling and giving way, renders it difficult and painful to walk near any of these fissures. The water of a rivulet which flows down the sides of the mountain, and passes over this place, is made to boil with violence, and becomes loaded with sulphureous impregnations. Other branches of the same rivulet, which do not pass immediately near these fissures, remain cool and limpid; and thus you may with one hand touch one rill which is at the boiling point, and with the other hand touch another rill which is of the usual temperature of water in that climate. The exhalations of sulphur do not at all times proceed from the same fissures, but new ones appear to be daily formed, others becoming, as it were, extinct. On the margins of these fissures, and indeed almost over the whole place, are to be seen most beautiful crystallizations of sulphur, in many spots quite as fine and perfect as those from Vesuvius, or indeed as any other specimens I have ever met with. The whole mass of decomposed rock in the vicinity is, in like manner, quite penetrated by sulphur. I did not perceive at this place any trace of pyrites, or any other metallic substance, except indeed two or three small fragments of clay iron-stone at a little distance, but did not discover even this substance any where *in situ*. It is very probable that the bed of the glen or ravine might throw some light on the internal structure of the place; but it was too deep, and its banks infinitely too precipitous, for me to venture down to it. I understood that there was a similar exhalation and deposition of sulphur on the side of a mountain not more than a mile distant in a straight line; and a subterranean communication is supposed to exist between the two places.

"Almost every island in the western Archipelago, particularly those which have the highest land, has in like manner its sulphur, or, as the French better express it, its *souffrière*. This is particularly the case with Nevis, St. Kitt's, Guadaloupe, Dominica, Martinico, St. Lucia, and St. Vincent's. Some islands have several such places, analogous, I presume, to this of Montserrat; but in others, as Guadaloupe, St. Lucia, and St. Vincent's, there are decided and well characterized volcanos, which are occasionally active, and throw out ashes, scoriæ and lava with flame. The volcano of St. Vincent's is represented by Dr. Anderson, and others who have visited it, as extremely large and magnificent, and would bear a comparison with some of those of Europe. These circumstances appear to have been entirely overlooked by geologists in their speculations concerning the origin and formation of these islands. It has indeed occurred to most persons, on surveying the regular chain of islands extending from the southern Cape of Florida to the mouths of the Orinoco, as exhibited on the map, to conclude that it originally formed part of the American continent, and that the encroachments of the sea have left only the higher parts of the land, as insular points above its present level. But this hypothesis, however simple and apparently satisfactory in itself, will be found to accord very partially with the geological structure of the different islands. Many of them are made up entirely of vast accretions of marine organized substances; and others evidently owe their origin to a volcanic agency, which is either in some degree apparent at the present time, or else may be readily traced by vestiges comparatively recent. There is every reason to believe, however, that some of the islands are really of contemporaneous formation with the adjacent parts of the continent, from which they have been disjoined by the incursions of the sea, or by convulsions of nature, and it is probably in those islands which contain primitive rocks that we are chiefly to look for a confirmation of this supposition."

Sulphur antimonii præcipitatum. Sulphur auratum antimonii. This preparation of antimony appears to have rendered that called kermes mineral unnecessary. It is a yellow hydro-sulphuret of antimony, and therefore called hydro-sulphuretum stibii luteum in the new chemical nomenclature. As an alterative and sudorific it is in high estimation, and given in diseases of the skin and glands; and, joined with calomel, it is one of the most powerful and penetrating alteratives we are in possession of.

Sulphur auratum antimonii. The yellow hydro-sulphuret of antimony. See Sulphur antimonii præcipitatum.

Sulphur præcipitatum. Lac sulphuris. This preparation is mostly preferred to the flowers of sulphur, in consequence of its being freed from its impurities.

SULPHURES. (*sulphuretum*.) Sulphurets. Combinations of sulphur with different alkaline, earthy, and metallic bases.

SULPHU'REOUS. *a.* 1. Made of sulphur. 2. Partaking of the qualities of sulphur.

Sulphureous acid. See Acid and Sulphur.

SULPHU'REOUSNESS. *s.* The state of being sulphureous.

SULPHUR WORT. See Peucedanum.

SULPHURET OF ANTIMONY, in mineralogy. See Stibium.

Sulphuret of bismuth, in mineralogy. See Bismutum.

Sulphuret of copper, in mineralogy. See Cuprum.

Sulphuret of iron, in mineralogy. See Sulphur and Ferrum.

Sulphuret of mercury, in mineralogy. See Hydrargyrum.

Sulphuret of molybdene, in mineralogy. See Molybdænum.

Sulphuret of potash, in mineralogy. See Sulphur.

Sulphuret of silver, in mineralogy. See Argentum.

Sulphuret of tin, in mineralogy. See Stannum.

SULPHURETUM AMMONIACÆ. Hepar sulphuris volatile. In medicine. Boyle's or Beguine's fuming spirit. Sulphuret of ammoniac is obtained in the form of a yellow fuming liquor, by the ammoniac and sulphur uniting whilst in a state of gass during distillation. It excites the action of the absorbent system and diminished arterial action, and is given internally in diseases arising from the use of mercury, phthisis, diseases of the skin, and phlegmasiæ: externally it is prescribed in the form of bath in paralysis, contractura, psora, and cutaneous diseases.

Sulphuretum calcis. Hepar calcis. Sulphuret of lime. It is principally used as a bath in various diseases of the skin.

Sulphuretum hydrargyri nigrum. See Hydrargyrus cum sulphure.

Sulphuretum hydrargyri rubrum. See Hydrargyrus sulphuratus ruber.

Sulphuretum hydrargyri stibiatum nigrum. Æthiops antimonialis. Kermes mineral. It consists of three parts of quicksilver, and two parts of the red antimoniated hydrosulphuret, rubbed together. It is an efficacious remedy in worms, in atrophy of infants, diseases of the skin, amaurosis, &c.

Sulphuretum hydrargyri stibiatum rubrum. Cinnabaris antimonii. This preparation was formerly much esteemed in diseases of the skin, but is fallen into disuse in this country.

Sulphuretum potassæ. Hepar sulphuris. Sulphuret of potash. Liver of sulphur, having for its basis the vegetable alkali. The virtues and uses of this preparation are similar to those of the sulphuretum ammoniacæ.

Sulphuretum sodæ. See Hepar sulphuris.

Sulphuretum stibii nativum. Sulphuretum stibii nigrum. Antimonicum crudum. Its virtues are stimulant, diaphoretic, and alterative. See Sulphur.

SULPHURIC ACID. See Sulphur.

SULPHURIS FLORES. See Sulphur.

SULPHUROUS ACID. See Sulphur.

SULPICIA, an ancient Roman poetess, who lived under the reign of Domitian, and has been so much admired as to be termed the Roman Sappho. We have nothing, however, left of her writings but a satire, or rather the fragment of one, against Domitian, who published a decree for the banishment of philosophers from Rome: which satire is to be found in Scaliger's Appendix Virgiliana. She is mentioned by Martial and Sidonius Apollinaris; and is said to have addressed a poem on conjugal love to her husband Calenus, a Roman knight.

SULPICIUS (Severus), an ecclesiastical writer who flourished about the beginning of the 5th century, and was contemporary with Rufinus and St. Jerome. He was the disciple of St. Martin of Tours, whose life he has written; and the friend of Paulinus bishop of Nola, with whom he held an intimate correspondence. The principal of his works is his Historia Sacra, from the creation of the world to the consulate of Stilicho and Aurelian, about the year 400; in which his style is elegant beyond the age he lived in.

SULTAN, or Soldon, a title or appellation given to the emperor of the Turks. Vattier will have the word Turkish, and to signify king of kings; adding, that it was first given to the Turkish princes Angrolipex and Masgud, about the year 1055: others will have it originally Persian, alleging in proof hereof, an ancient medal of Cosroe: others derive it from *soldanus, quasi solus dominus*: others from the Hebrew שלט, *schalat* or *sheleth*, to rule, to reign. It had its rise under Mahmoud son of Sebecteghin, the first emperor of the dynasty of the Gaznevides, towards the close of the fourth century of the era of the Hegira: when that prince going to Segestan to reduce Kalaf governor of that province, who affected the sovereignty, Kalaf was no sooner advertised of his coming than he went out to meet him, delivered the keys of his fortress, and owned him his sultan, that is, his lord or commander. The title pleased Mahmoud so well, that he assumed it ever afterwards; and from him it passed to his descendants.

SULTANA, or Sultaness, the queen of a sultan.

SULTAN FLOWER. The centaurea moschata of Linnéus.

SULTANIA, a considerable town of Persia, in Irac Agemi. Here is a magnificent mosque, which contains a tomb of sultan Chodabend. It is 50 miles N.W. of Casbin. Lon. 51. 53 E. Lat. 36. 16 N.

SULTANPOUR, a town of Hindustan Proper, in the province of Lahore, 62 miles S.E. of Lahore. Lon. 73. 50 E. Lat. 30. 25 N.

Sultanpour, a town of Hindustan Proper, in the province of Oude, 32 miles S. of Fyzabad, and 50 N. of Allahabad. Lon. 82. 30 E. Lat. 29. 5 N.

SU'LTANRY. *s.* (from *sultan.*) An eastern empire (*Bacon*).

SU'LTRINESS. *s.* (from *sultry.*) The state of being sultry; close and cloudy heat.

SU'LTRY. *a.* Hot without ventilation; hot and close; hot and cloudy (*Addison*).

SULTZ, a town of Suabia, in the duchy of Wirtemberg, near the Neckar, where are some salt-works, sufficient to supply the duchy with salt. It is 12 miles S.E. of Freudenstadt, and 12 N. of Rothwell. Lon. 8. 35 E. Lat. 48. 18 N.

Sultz, a town of France, in the department of Upper Rhine, with a medicinal spring, 12 miles S.S.W. of Colmar.

SULTZBACH, a town of Germany, in the palatinate of Bavaria, with a castle, subject to the duke of Neuberg Sultzbach. It is 10 miles N.W. of Amberg, and 32 N. of Ratisbon. Lon. 11. 56 E. Lat. 49. 38 N.

SULTZBURG, a town of Suabia, in the margravate of Baden-Durlach, with a fine palace. It is seated in a territory fertile in good wine, eight miles S.W. of Friburg. Lon. 7. 30 E. Lat. 47. 54 N.

SULZER (John George), a Swiss philosopher, was born at Winterthurn, in the canton of Zurich, in 1720. He published, at 21, Moral Contemplations on the Works of Nature; and also a Description of the most remarkable Antiquities in the Lordship of Knonau. These were followed by an account of a journey he took in the Alps, which shewed at the same time his knowledge of natural history, and the taste and sensibility with which he surveyed the beauties of nature, and the grandeur and goodness of its Author. He afterwards became private tutor to a young gentleman at Magdeburg. This procured him the acquaintance of Messrs. Maupertuis, Euler, and Sack, which opened to his merit the path of preferment, and advanced him successively to the place of mathematical professor in the King's college at Berlin, in 1747, and to that of member of the Royal Academy in 1750.

In this last quality he distinguished himself in a very eminent manner, enriched the class of speculative philosophy with a great number of excellent memoirs, and was justly considered as one of the first-rate metaphysicians in Germany. But his genius was not confined to this branch of science. His Universal Theory of the Fine Arts is a valuable production. A profound knowledge of the arts and sciences, and a perfect acquaintance with true taste, are eminently displayed in this work, and will secure to its author a permanent and distinguished rank in the republic of letters. The first volume of this excellent work was published in 1771, and the second in 1774. We shall not here give a catalogue of the writings of M. Sulzer; but we cannot help mentioning his Remarks on the Philosophical Essays of the late Mr. Hume, as a work of real merit, which does justice to the acuteness, while it often detects the sophistry of the British Bayle. He died a very placid and happy death, in 1779.

SUM. *s.* (*summa*, Latin; *summe*, French.) 1. The whole of any thing; many particulars aggregated to a total (*Hooker*). 2. Quantity of money (*Shakspeare*). 3. Compendium; abridgment; the whole abstracted (*Hooker*). 4. The amount; the result of reasoning or computation (*Tillotson*). 5. Height; completion (*Milton*).

To SUM. *v. a.* (*sommer,* French.) 1. To compute; to collect particulars into a total; to cast up (*South*). 2. To comprise; to comprehend; to collect into a narrow compass (*Dryden*). 3. (In falconry). To have feathers full grown.

SUMACH. (*sumak,* from *samak,* to be red; Heb. so called from its red berry.) Elm-leaved sumach. This plant, rhus coriaria; foliis pinnatis obtusis, caule serratis corolibus subtus villosis of Linnéus. C. O. Pentandria, trigynia, is a small tree, a native of the south of Europe. It is singular that this is the only species of the genus rhus which is perfectly innocent; the others being active poisons. Both the leaves and berries of this plant are used medicinally as astringents and tonics; the former are the most powerful, and have been long in common use, where they may be easily obtained in various complaints indicating this class of remedies. The berries, which are red, and of a roundish compressed figure, contain a pulpy matter, in which is lodged a brown, hard, oval seed, manifesting a considerable degree of adstringency. The pulp, even when dry, is grateful, and has been discovered to contain an essential salt similar to that of woodsorrel. An infusion of the dried fruit is not rendered black by a solution of iron; hence it appears to be destitute of astringency. But its acidity is extremely grateful; therefore, like many other fruits, these berries may be advantageously taken to allay febrile heat, and to correct bilious putrescency.

This plant is very extensively used as a dye; and is for this purpose imported largely into Europe, from Spain, Portugal, Syria, and many parts of the Levant. Every part of the tree appears impregnated with astringent matter. The parts employed for dyeing are the entire twigs and branches, which are dried and ground in a mill into a coarse brown or yellowish green powder, and in this form we receive it when imported.

Sumach readily yields a yellowish-green infusion with warm water, which soon turns brown on exposure to air. This infusion gives a small quantity of yellow lake with alum, and forms with the solutions of iron an abundant black or dark brown precipitate, showing the presence of gallic acid. As a tincture, it gives by itself a yellow-buff, or fawn colour tending to green, which, however, is fugitive unless fixed by a mordant. If a salt of iron enter into the mordant, the black of the gallat of iron hereby produced mixes with the natural colour of the sumach, and a vast variety of useful grey, drab, and slate colours, are brought out. Sumach, like the gall-nut, contains also a very large quantity of tar, and hence will give a copious precipitate with infusion of glue or any other animal jelly; so that it has an additional use in the preparation of leather, the finer kinds of which are tanned by this material. See the article TANNING. A good deal of sulphat of lime is found in the infusion of sumach by the barytic and oxaline tests. The infusion of this plant differs from that of the other astringent vegetables in giving a precipitate with the caustic alkalies, which is probably owing to the sulphat of lime which it contains. Sir Humphry Davy obtained 165 grains of matter soluble in water from 480 grains of Sicilian sumach, of which he estimates 78 grains to be tannin.

SUMACH (Currier's, and myrtle-leaved), in botany, different species of coriaria.

SUMATRA, an island of Asia, the most western of the Sunda Islands. Its general direction is nearly N.W. and S.E. The equator divides it into almost equal parts; the one extremity being in 5. 33 N. the other in 5. 56 S. lat. and Achen Head, its N. extremity, is in lon. 95. 34 E. It is separated from Malacca by the straits of that name, and from Java by the straits of Sunda. It is 900 miles in length, and from 150 to 200 in breadth. No account has been given of this island, by any Englishman, till the year 1778, when Mr. Millar (son of the celebrated botanist) gave an account of the manners of a particular district. These were the Battas, a people who live in the interior parts, called the Cassia country. They differ from all the other inhabitants in language, manners, and customs. They eat the prisoners whom they take in war, and hang up their skulls as trophies in their houses. He observes, however, that human flesh is eaten by them *in terrorem,* and not as common food; though they prefer it to all others, and speak with peculiar raptures of the soles of the feet and palms of the hands. They expressed much surprise that the white people did not kill, much less eat, their prisoners. From this country the greatest part of the cassia that is sent to Europe is procured. It abounds also with the camphire trees, which constitute the common timber in use; and in these trees the camphire is found native, in a concrete form. In 1783, Mr. Marsden, who had been secretary to the president and council of Fort Marlborough, published an account of this island, and represents it as surpassed by few in the beautiful indulgences of nature. A chain of high mountains runs through its whole extent; the ranges, in many parts, being double and treble: their altitude, though great, is not sufficient to occasion their being covered with snow during any part of the year. Between these ridges are extensive plains, considerably elevated above the surface of the maritime lands. In these the air is cool; and from this advantage they are esteemed the most eligible portion of the country, are the best inhabited, and the most cleared from the woods, which elsewhere, in general, cover both hills and valleys with a constant shade. Here too are found many lakes and rivers, that facilitate the communication between the different parts.

The inhabitants consist of Malays, Achenese, Battas, Lampoons, and Rejangs: the latter are taken as a standard of description with respect to the person, manners, and customs of the Sumatrans. They are rather below the middle stature; their bulk in proportion; their limbs, for the most part, slight, but well shaped, and particularly small at the wrists and ancles. Their hair is strong and of a shining black. The men are beardless; great pains being taken to render them so, when boys, by rubbing their chins with a kind of quicklime. Their complexion is properly yellow, wanting the red tinge that constitutes a copper or tawny colour; those of the superior class, who are not exposed to the rays of the sun, and particularly their women of rank, approaching to a degree of fairness; but the major part of the females are ugly. The rites of marriage among the Sumatrans consist simply in joining the hands of the parties, and pronouncing them man and wife, without much ceremony, excepting the entertainment which is given upon the occasion. But little apparent courtship precedes their marriages. Their manners do not admit of it; the young people of each sex being carefully kept asunder, and the girls being seldom trusted from their mothers. The opportunities which the young people have of seeing and conversing with each other are at the public festivals, where the persons who are unmarried meet together, and dance and sing in company. A man, when determined in his choice, generally employs an old woman as his agent, by whom he sends a present to the female of his choice. The parents then interfere, and the preliminaries being settled, a feast takes place. At these festivals a goat, a buffalo, or several, according to the rank of the parties, are killed, to entertain not only the relations and invited guests, but all the inhabitants of the neighbouring country who choose to repair to them. The greater the concourse, the more is the credit of the host, who is generally, on these occasions, the father of the girl. The customs of the Sumatrans permit their having as many wives as they can purchase, or afford to maintain; but it is extremely rare that an instance occurs of their having more than one, and that only among a few of the chiefs. This continence they owe, in some measure, to their poverty. Mothers carry their children straddling on the hip, and usually supported by a cloth tied in a knot on the opposite shoulder. The children are nursed but little; are not confined by any swathing or bandages; and being suffered to roll about the floor, soon learn to walk and shift for themselves: when cradles are used, they swing suspended from the ceiling of the room. The original natives of Sumatra are pagans; but it is to be observed, that when the Sumatrans, or any of the natives of the eastern islands, learn to read the Arabic character, and submit to circumcision, they are said to become Malays; the term Malay being understood to mean Mussulman. The wild beasts of Sumatra are tigers, elephants, rhinoceroses, bears, and monkeys. The tigers prove to the inhabitants, both in their journeys and even their domestic occupations, most destructive enemies; yet, from a superstitious prejudice, it is with difficulty they are prevailed upon to use methods for destroying them, till they have sustained some particular injury in their own family or kindred. Alligators likewise occasion the loss of many inhabitants, as they bathe in the river, according to their regular custom; and yet a superstitious idea of their sanctity also preserves them from molestation. The other animals of Sumatra are buffalos, a small kind of horses, goats, hogs, deer, bullocks, and hog-deer. This last is an animal somewhat larger than a rabbit, the head resembling that of a hog, and its shanks and feet like those of the deer: the bezoar stone found on this animal has been valued at ten times its weight in gold. Of birds there are a greater variety than of beasts. The coo-ow, or Sumatran pheasant, is a bird of uncommon beauty. Here are storks of a prodigious size, parrots, dunghill fowls, ducks, the largest cocks in the world, woodpigeons, doves, and a great variety of small birds remarkable for the beauty of their colours. The reptiles are lizards, flying lizards, and cameleons. The island swarms with insects, and their varieties are no less extraordinary than their numbers. Rice is the only grain that grows in the country. Here are sugar-canes, beans, peas, radishes, yams, potatoes, pumkins, and several kinds of potherbs unknown to Europe; and also most of the fruits to be met with in other parts of the East Indies, in the greatest perfection. Indigo, saltpetre, sulphur, arsenic, brazil wood, two species of the bread fruit tree, pepper, cassia, camphire, benjamin, coffee, and cotton, are likewise the produce of this island. Here also is the cabbage tree and silk cotton tree; and the forests contain a great variety of valuable species of wood, as ebony, pine, sandal, eagle, or aloes, teak, manchineel, and iron wood, and also the banyan tree. Bees wax is a commodity of great importance here; and there are likewise edible birds-nests. Gold, tin, iron, copper, and lead, are found in the country; and the former is as plentiful here as in any part of Asia. Sumatra is divided into many petty kingdoms, the chief of which are Acheen, Indrapore, Palimban, and Jambi. The English and Dutch have factories on this island; the principal one of the former being Fort Marlborough, at Bencoolen.

SU'MLESS. *a.* (from *sum.*) Not to be computed (*Pope*).

SU'MMARILY. *ad.* (from *summary.*) Briefly; the shortest way (*Hooker*).

SU'MMARY. *a.* (*summaire*, Fr.) Short; brief; compendious (*Swift*).

SU'MMARY. *s.* (from the adjective.) Compendium; abridgment (*Rogers*).

SUMMER, the name of one of the seasons of the year, being one of the quarters when the year is divided into four quarters, or one half when the year is divided only into two, summer and winter. In the former case, summer is the quarter during which, in northern climates, the sun is passing through the three signs Cancer, Leo, Virgo, or from the time of the greatest declination, till the sun come to the equinoctial again, or have no declination; which is from about the 21st of June till about the 22d of September. In the latter case, summer contains the six warmer months, while the sun is on one side of the equinoctial; and winter the other six months, when the sun is on the other side of it.

It is said, that a frosty winter produces a dry summer; and a mild winter, a wet summer. See Philos. Trans. No. 458, sect. 10.

SUMMER SOLSTICE, the time or point when the sun comes to its greatest declination, and nearest the zenith of the place. See SOLSTICE.

SUMMER BEAM, in carpentry, a large piece of timber, which, being supported on two stone piers or posts, serves as a lintel to a door, window, &c.

SUMMER CYPRESS. See CHENOPODIUM.

SUMMER ISLANDS. See BERMUDAS.

SUMMER RED BIRD. See MUSICAPA.

To SU′MMER. *v. n.* (from the noun.) To pass the summer (*Isaiah*).

To SU′MMER. *v. a.* To keep warm (*Shakspeare*).

SU′MMERHOUSE. *s.* (from *summer* and *house.*) An apartment in a garden used in the summer (*Watts*).

SU′MMERSAULT. SU′MMERSET. *s.* (*soubresault*, Fr.) A high leap, in which the heels are thrown over the head (*Walton*).

SU′MMIT. *s.* (*summitas*, Latin.) The top; he utmost height (*Shakspeare*).

To SU′MMON. *v. a.* (*summoneo*, Latin.) 1. To call with authority; to admonish to appear; to cite (*Pope*). 2. To excite; to call up; to raise (*Shakspeare*).

SU′MMONER. *s.* (from *summon.*) One who cites; one who summons (*Shakspeare*).

SU′MMONS. *s.* A call of authority; admonition to appear; citation (*Milton*).

SUMMUM BONUM, in ethics, the chief good.

SUMOROKOF (Alexander), the father of the Russian stage, was born at Moscow in 1727. He received a liberal education, and soon showed a strong turn for poetry. He was patronized by count Ivan Shuvalof, who introduced him to the empress Elizabeth. About the 29th year of his age he wrote the tragedy of Koref, which laid the foundation of the Russian theatre. This piece was first acted by some young men who had previously performed a French play; and this reaching the ears of the empress, she ordered the tragedy to be exhibited in her presence. The applause which the author received on this occasion stimulated him to further exertions, and he wrote several other dramatic pieces, both tragic and comic. He also attempted every species of poetry except the epic, and was the author of a few historical works. The empress Elizabeth rewarded him with the rank of a brigadier; appointed him director of the Russian theatre, and settled upon him a pension of 400*l.* per annum. Catharine II. created him counsellor of state, conferred upon him the order of St. Anne, and honoured him with many other marks of distinction. He died in 1777.

SUMP, in metallurgy, a round pit of stone, lined with clay within, for the receiving the metal on its first fusion from the ore.

SUMP, in the British salt-works, where sea-water is boiled into salt, is the name of a sort of pond, which is made at some distance from the saltern on the sea-shore, between full sea and low water mark. From this pond a pipe is laid, through which, when the sea is in, the water runs into a well adjoining to the saltern; and from this well it is pumped into troughs, through which it is carried to the cisterns, in order to be ready to supply the pans. See SALT.

SUMPH, in mining, denotes a pit sunk down in the bottom of the mine, to cut or prove the lode still deeper than before; and in order to slope and dig it away if necessary, and also to drive on the lode in depth.

SU′MPTER. *s.* (*sommier*, French.) A horse that carries the clothes or furniture (*Dryden*).

SU′MPTION. *s.* (from *sumptus*, Latin.) The act of taking: not in use (*Taylor*).

SU′MPTUARY. *a.* (*sumptuarius*, Latin.) Relating to expence; regulating the cost of life (*Bacon*).

SUMPTUO′SITY. *s.* (from *sumptuous.*) Expensiveness; costliness: not used (*Raleigh*).

SU′MPTUOUS. *a.* (*sumptuosus*, Latin.) Costly; expensive; splendid (*Atterbury*).

SU′MPTUOUSLY. *ad.* (from *sumptuous.*) Expensively; with great cost (*Bacon*).

SU′MPTUOUSNESS. *s.* (from *sumptuous.*) Expensiveness; costliness (*Boyle*).

SUN. SOL. ⊙, in astronomy, the great luminary which enlightens the world, and by his presence constitutes day.

The sun, which was reckoned among the planets in the infancy of astronomy, should rather be counted among the fixed stars. He only appears brighter and larger than they do, because we keep constantly near the sun; whereas we are immensely farther from the stars. But a spectator, placed as near to any star as we are to the sun, would probably see that star a body as large and as bright as the sun appears to us; and, on the other hand, a spectator as far distant from the sun as we are from the stars would see the sun as small as we see a star, divested of all his circumvolving planets; and he would reckon it one of the stars in numbering them.

According to the Pythagorean and Copernican hypothesis, which is now generally received, and has been demonstrated to be the true system, the sun is the common centre of all the planetary and cometary system; around which all the planets and comets, and our earth among the rest, revolve, in different periods, according to their different distances from the sun.

But the sun, though thus eased of that prodigious motion by which the ancients imagined he revolved daily round our earth, yet is by no means a perfectly quiescent body. For, from the phenomena of his maculæ or spots, it evidently appears that he has a rotation round his axis, like that of the earth, by which our natural day is measured, but only slower. For some of these spots have made their first appearance near the edge or margin of the sun, from thence they have seemed gradually to pass over the sun's face to the opposite edge, then disappear; and hence, after an absence of about 14 days, they have reappeared in their first place, and have taken the same course over again; finishing their entire circuit in *27d. 12h. 20m.*; which is hence inferred to be the period of the sun's rotation round his axis: and therefore the periodical time of the sun's revolution to a fixed star is *25d. 15h. 16m*; because in *27d. 12h. 20m.* of the month of May, when the observations were made, the earth describes an angle about the sun's centre of 26° 22′, and therefore as the angular motion $360° + 26° 22' : 360° : : 27d.\ 12h.\ 20m. : 25d.\ 15h.\ 16m.$

This motion of the spots is from west to east: whence we conclude the motion of the sun, to which the other is owing, to be from east to west.

Besides this motion round his axis, the sun, on account of the various attractions of the surrounding planets, is agitated by a small motion round the centre of gravity of the system: and has farther, in all probability, either a progressive motion, or a very slow one, round some amazingly remote centre of force.

In a paper on the construction of the heavens, Dr. Herschel says it is very probable that the great stratum called the milky way is that in which the sun is placed; though perhaps not in the centre of its thickness, but not far from the place where some smaller stratum branches from it. Such a supposition will satisfactorily and with great simplicity account for all the phenomena of the milky way, which, according to this hypothesis, is no other than the appearance of the projection of the stars contained in this stratum, and its secondary branch. See GALAXY.

In another paper on the same subject, he says, that the milky way is a most extensive stratum of stars of various sizes admits no longer of the least doubt; and that our sun is actually one of the heavenly bodies belonging to it is as evident.

We will now, says the doctor, retreat to our own retired station in one of the planets attending a star in the great combination, with numberless others; and in order to investigate what will be the appearances from this contracted situation let us begin with the naked eye. The stars of the first magnitude, being in all probability the nearest, will furnish us with a step to begin our scale; setting off, therefore, with the distance of Sirius or Arcturus, for instance, as unity, we will at present suppose, that those of the second magnitude are at double, and those of the third at treble the distance, and so forth. Taking it, then, for granted, that a star of the seventh magnitude is about seven times as far from us as one of the first, it follows that an observer, who is enclosed in a globular cluster of stars, and not far from the centre, will never be able, with the naked eye, to see to the end of it: for since, according to the above estimations, he can only extend his view about seven times the distance of Sirius, it cannot be expected that his eyes should reach the borders of a cluster which has perhaps not less than fifty stars in depth every where around him. The whole universe, therefore, to him will be comprised in a set of constellations, richly ornamented with scattered stars of all sizes. Or if the united brightness of a neighbouring cluster of stars should, in a remarkably clear night, reach his sight, it will put on the appearance of a small, faint, nebulous cloud, not to be perceived without the greatest attention. Allowing him the use of a common telescope, he begins to suspect that all the milkiness of the bright path which surrounds the sphere may be owing to stars. By increasing his power of vision, he becomes certain that the milky way is, indeed, no other than a collection of very small stars, and the nebulæ nothing but clusters of stars.

Dr. Herschel then solves a general problem for computing the length of the visual ray: that of the telescope which he uses will reach to stars 497 times the distance of Sirius. Now, according to the doctor's reasoning, Sirius cannot be nearer than 100,000 × 194,000,000 miles, therefore his telescope will, at least, reach to 100,000 × 194,000,000 × 497 miles. And Dr. Herschel says, that in the most crowded part of the milky way, he has had fields of view that contained no less than 588 stars, and these were continued for many minutes, so that in a quarter of an hour he has seen 116,000 stars pass through the field view of a telescope of only 15′ aperture: and at another time, in 41 minutes, he saw 258,000 stars pass through the field of his telescope. Every improvement in his telescopes has discovered stars not seen before, so that there appears no bounds to their number, or to the extent of the universe.

The sun, like many other stars, has probably a progressive motion, directed towards the constellation Hercules. Dr. Herschel, on this subject, observes that the apparent proper motions of 44 stars out of 56 are nearly in the direction which would be the result of such a real motion of the solar system; and that the bright stars Arcturus and Sirius, which are probably the nearest to us, have, as they ought, according to this theory, the greatest apparent motions. Again, the star Castor appears, when viewed with a telescope, to consist of two stars, of nearly equal magnitude; and though they have both an apparent motion, they have never been found to change their distance with respect to one another a single second, a circumstance which is easily understood if both their apparent motions are supposed to arise from the real motion of the sun.

The sun revolves on his axis in $25d.15h.$ with respect to the fixed stars; this axis is directed towards a point about half way between the pole star and Lyra, the plane of the rotation being inclined a little more than 7° to that in which the earth revolves. The direction of this motion is from west to east. All the rotations of the different bodies which compose the solar system as far as they have been ascertained, are in the same direction, and likewise all their revolutions, excepting those of some of the comets, and those of some of the satellites of the Herschel planet.

The time and the direction of the sun's rotation are ascertained by the change of the situation of the spots, which are usually visible on his disc, and which some astronomers supposed to be elevations, and others to be excavations in the luminous matter covering the sun's surface. These spots are frequently observed to appear and disappear, and they are in the mean time liable to great variations, though they are generally found about the same points of the sun's surface. M. Lalande supposes them to be parts of the solid body of the sun, which by some agitations of the luminous ocean, with which he conceives the sun to be surrounded, are left nearly or entirely bare. Dr. Wilson and Dr. Herschel are disposed to consider this ocean as consisting rather of a flame than of a liquid substance; and Dr. Herschel, in an ingenious paper, attributes the spots to the emission of an æriform fluid, not yet in combustion, which displaces the general luminous atmosphere, and which is afterwards to serve as fuel for supporting the process; hence he supposes the appearance of copious spots to be indicative of the approach of warm seasons on the surface of the earth, a theory which he has attempted to maintain by historical evidence. The exterior luminous atmosphere has an appearance somewhat mottled; some parts of it, appearing brighter than others, have been called faculæ, but Dr. Herschel distinguishes them by the names of ridges and nodules. The spots are usually surrounded by margins less dark than themselves, which are called shallows, and which are considered as parts of an inferior stratum, consisting of opaque clouds, capable of protecting the immediate surface of the sun from the excessive heat produced by combustion in the superior stratum, and perhaps rendering it habitable to animated beings.

To which Dr. Young replies, if we inquire into the intensity of the heat which must necessarily exist wherever this combustion is performed, we shall soon be convinced that no clouds, however dense, could impede its rapid transmission to the parts below. Besides the diameter of the sun is 111 times as great as that of the earth; and at its surface a heavy body would fall through no less than 450 feet in a single second; so that if every other circumstance permitted human beings to reside on it, their own weight would present an insuperable difficulty, since it would become thirty times as great as upon the surface of the earth, and a man of moderate size would weigh above two tons.

Dr. Herschel, in another paper, supposes that the spots in the sun are mountains on its surface, which, considering the great attraction exerted by the sun upon bodies placed at its surface, and the slow revolution it has about its axis, he thinks may be more than 300 miles high, and yet stand very firmly. He says, that in August 1792, he examined the sun with several powers from 90 to 500, and it evidently appeared, that the black spots are the opaque ground or body of the sun; and that the luminous part is an atmosphere, which being intercepted or broken, gives us a glimpse of the sun itself. Hence he concludes, that the sun has a very extensive atmosphere, which consists of elastic fluids that are more or less lucid and transparent; and of which the lucid ones furnish us with light. This atmosphere, he thinks, is not less than 1843, nor more than 2765 miles in height; and he supposes that the density of the luminous solar clouds need not be exceedingly more than that of our aurora borealis, in order to produce the effects with which we are acquainted.

The similarity of the sun to the other globes of the solar system, with regard to its solidity; its atmosphere; its surface diversified with mountains and valleys; its rotation on its axis; and the fall of heavy bodies on its surface; leads us to suppose that it is most probably inhabited, like the rest of the planets, by beings whose organs are adapted to the peculiar circumstances of that vast globe. If it be objected, that from the effects produced at the distance of 95,000,000 miles, we may infer, that every thing must be scorched up at its surface: we reply, that there are many facts in natural philosophy which show that heat is produced by the sun's rays only when they act on a calorific medium: they are the cause of the production of heat by uniting with the matter of fire which is contained in the substances that are heated; as the collision of the flint and steel will inflame a magazine of gunpowder, by putting all the latent fire which it contains into action. On the tops of mountains of sufficient height, at the altitude where clouds can seldom reach to shelter them from the direct rays of the sun, we always find regions of ice and snow. Now, if the solar rays themselves conveyed all the heat we find on this globe, it ought to be hottest where their course is the least interrupted. Again, our aëronauts all confirm the coldness of the upper regions of the atmosphere; and since, therefore, even on our earth the heat of the situation depends upon the readiness of the medium to yield to the impression of the solar rays, we have only to admit, that on the sun itself the elastic fluids composing its atmosphere, and the matter on its surface, are of such a nature as not to be capable of any extensive affection of its own rays; and this seems to be proved by the copious emission of them; for if the elastic fluids of the atmosphere, or of the matter contained on the surface of the sun, were of such a nature as to admit of an easy chemical combination with its rays, their emission would be very much impeded. Another well known fact is, that the solar focus of the largest lens thrown into the air, will occasion no sensible heat in the place where it has been kept for a considerable time, although its power of exciting combustion, when proper bodies are exposed, should be sufficient to fuse the most refractory substances.

It is by analogical reasoning that we consider the moon as inhabited. For it is a secondary planet of considerable size, its surface is diversified, like that of the earth, with hills and valleys. Its situation with respect to the sun is much like that of the earth; and by a rotation on its axis, it enjoys an agreeable variety of seasons, and of day and night. To the moon our globe would appear a capital satellite, undergoing the same changes of illumination as the moon does to the earth. The sun, planets, and the starry constellations of the heavens, will rise and set there as they do here: and heavy bodies will fall on the moon as they do on the earth. There seems, then, only to be wanting, in order to complete the analogy, that it should be inhabited like the earth. It may be objected, that in the moon there are no large seas; and its atmosphere (the existence of which is doubted by many) is extremely rare, and unfit for the purposes of animal life; that its climates, its seasons, and the length of its days and nights, totally differ from ours; that without dense clouds, which the moon has not, there can be no rain, perhaps no rivers and lakes. In answer to this it may be observed, that the very difference between the two planets strengthens the argument. We find even on our own globe, that there is a most striking dissimilarity in the situation of the creatures that live upon it. While man walks on the ground, the birds fly in the air, and the fishes swim in the water. We cannot surely object to the conveniencies afforded by the moon, if those that are to inhabit its regions are fitted to their conditions as well as we on this globe of ours. The analogy already mentioned establishes a high probability that the moon is inhabited.

Suppose, then, an inhabitant of the moon, who has not properly considered such analogical reasonings as might induce him to surmise that our earth is inhabited, were to give it as his opinion, that the use of that great body which he sees in his neighbourhood is to carry about his little globe, in order that it may be properly exposed to the light of the sun, so as to enjoy an agreeable and useful variety of illumination, as well as to give it light by reflection, when direct light cannot be had. Should we not condemn his ignorance and want of reflection? The earth, it is true, performs those offices which have been named, for the inhabitants of the moon, but we know that it also affords magnificent dwelling-places to numberless intelligent beings. From experience, therefore, we affirm, that the performance of the most salutary offices to inferior planets is not inconsistent with the dignity of superior purposes; and in consequence of such analogical reasonings, assisted by telescopic views, which plainly favour the same opinion, we do not hesitate to admit that the sun is richly stored with inhabitants.

This way of considering the sun is of the utmost importance in its consequences. That stars are suns can hardly admit of a doubt. Their immense distance would effectually exclude them from our view, if their light was not of the solar kind. Besides, the analogy may be traced much further: the sun turns on its axis; so does the star Algol; so do the stars called β Lyræ, δ Cephei, η Antinoi, ο Ceti, and many more, most probably all. Now from what other cause can we, with so much probability, account for their periodical changes? Again, our sun's spots are changeable; so are the spots on the star ο Ceti. But if stars are suns, and suns are inhabitable, we see at once what an extensive field for animation opens to our view.

It is true, that analogy may induce us to conclude, that since stars appear to be suns, and suns, according to the common opinion, are bodies that serve to enlighten, warm, and sustain a system of planets, we may have an idea of numberless globes that serve for the habitation of living creatures. But if these suns themselves are primary planets, we may see some thousands of them with the naked eye, and millions with the help of telescopes; and, at the same time, the same analogical reasoning still remains in full force with regard to the planets which these suns may support. See Philosophical Transactions in various places, and Young's Natural Philosophy. See also our articles ASTRONOMY and STAR.

To SUN. *v. a.* (from the noun.) To insolate; to expose to the sun (*Dryden*).

SU'NBEAM. *s.* (*sun* and *beam.*) Ray of the sun (*South*).

SU'NBEAT. *part. a.* (*sun* and *beat.*) Shone on fiercely by the sun (*Dryden*).

SU'NBRIGHT. *a.* (*sun* and *bright.*) Resembling the sun in brightness (*Milton*).

SU'NBURNING. *s.* (*sun* and *burning.*) The effect of the sun upon the face (*Boyle*).

SU'NBURNT. *part. a.* (*sun* and *burnt.*) 1. Tanned; discoloured by the sun (*Addison*). 2. Scorched by the sun (*Blackmore*).

SUNBURY, a seaport of the state of Georgia, in Liberty county, with a safe and convenient harbour. The town being very healthy, is the resort of the planters from the adjacent country, during the sickly months. It was burnt during the late war, but has been rebuilt, and is 34 miles S. by W. of Savanna. Lon. 81. 0 W. Lat. 31. 33 N.

SUNBURY, a town of Pennsylvania, chief of Northumberland county, with two churches. It stands on the E. side of the Susquehanna, just below the junction of the E. and W. branches, 120 miles N.W. of Philadelphia. Lon. 77. 0 W. Lat. 40. 48 N.

SU'NCLAD. *part. a.* (*sun* and *clad.*) Clothed in radiance; bright.

SUNDA ISLANDS, islands in the S.E. part of the Indian ocean. The chief of them are Borneo, Sumatra, and Java; the two latter separated by a channel called the Strait of Sunda.

SUNDAY, the first day of the week; thus called by our idolatrous ancestors, because set apart for the worship of the sun.

It is sometimes called the Lord's Day, because kept as a feast in memory of our Lord's resurrection on this day: and also Sabbath-day, because substituted under the new law instead of the sabbath in the old law.

Some are of opinion that the Lord's day, mentioned in the Apocalypse, is our Sunday; which they believe was so early instituted by the apostles. Be this as it will, it is certain a regard was had to this day even in the earliest ages of the church; as appears from the first apology of Justin Martyr, where he describes the exercise of the day not much unlike to ours. But it was Constantine the Great who first made a law for the proper observation of Sunday; and who, according to Eusebius, appointed it should be regularly celebrated throughout the Roman empire. Before him, and even in his time, they observed the Jewish Sabbath as well as Sunday; both to satisfy the law of Moses and to imitate the apostles, who used to meet together on the first day. By Constantine's laws, made in 321, it was decreed, that for the future the Sunday should be kept a day of rest in all cities and towns; but he allowed the country people to follow their work. In 538 the council of Orleans prohibited country labour; but because there were still many Jews in Gaul, and the people fell into many superstitious usages in the celebration of the new sabbath, like those of the Jews among that of the old, the council declares, that to hold it unlawful to travel with horses, cattle, and carriages, to prepare food, or to do any thing necessary to the cleanliness and decency of houses or persons, savours more of Judaism than of Christianity. See SABBATH-BREAKING.

SUNDAY LETTER. See DOMINICAL LETTER, and CHRONOLOGY.

To SU'NDER. *v. a.* (ꞅẏnꝺꞃıan, Sax.) To part; to separate; to divide (*Donne*).

SU'NDER. *s.* (ꞅunꝺeꞃ, Saxon.) Two; two parts (*Psalms*).

SUNDERBUNDS, or THE WOODS, a tract of country, consisting of that part of the Delta of the Ganges, in Bengal, which borders on the sea. In extent it is equal to the principality of Wales. It is completely enveloped in woods, infested with tigers, and composed of a labyrinth of rivers and creeks, all of which are salt, except those that immediately communicate with the principal arm of the Ganges. Here salt, in quantities equal to the whole consumption of Bengal and its dependencies, is made and transported with equal facility; and here also is found an inexhaustible store of timber for boat-building.

SUNDERBURG, a town of Denmark, in the island of Alsen, with a castle. It is seated on a strait, called Sunderburg Sound, 12 miles E. of Flensburg. Lon. 10. 0 E. Lat. 54. 51 N.

SUNDERDOO, or MELUNDY, a fortified island and seaport of the Deccan of Hindustan, on the Concan coast, reduced by commodore James in 1756. It is about 10 miles N.E. of Vingorla Rocks, and 36 N.N.W. of Goa. Lon. 73. 20 E. Lat. 16. 3 N.

SUNDERLAND, a seaport in the bishopric of Durham. It is a flourishing town, and, for the exportation of coal, is next in consequence, on that side of the kingdom, to Newcastle. Its port at the mouth of the Wear will not admit very large ships; but vessels hence can get out to sea much more readily than from the Tyne. The coal is brought down the Wear from numerous pits near its banks. Here are several glasshouses; and there is an exportation of grindstones and other articles. It is 13 miles N.E. of Durham, and 264 N. by W. of London. Lon. 1. 14 W. Lat. 54. 56 N.

SUNDEW. See ROS SOLIS and DROSERA.

SUNDI, a province of Congo, which lies along the river Zaire. Its rivers render it extremely fertile, and in the mountains are mines of several metals. The capital is of the same name. Lon. 17. 55 E. Lat. 4. 50 S.

SU'NDIAL. *s.* (*sun* and *dial.*) A marked plate on which the shadow points the hour. See DIAL.

SU'NDRY. *a.* (ꞅundeꞃ, Saxon.) Several; more than one (*Sanderson*).

SUNDSWALL, a seaport of Sweden, in the division of Norland, and province of Medelpadia. The chief trade is in tar, bark of birch trees, deals, and linen. It is seated near the gulf of Bothnia, 195 miles N. by W. of Stockholm. Lon. 18. 5 E. Lat. 62. 45 E.

SUN-FISH, in ichthyology. See TETRODON.

SUNFLOWER. See HELIANTHUS.

SUN FLOWER (Dwarf American). See RUDBECKIA.

SUNFLOWER (Little). See CISTUS.

SUNFLOWER (Tick-seeded). See COREOPSIS.

SUNFLOWER (Spurge). See EUPHORBIA.

SUNG. The pret. and part. pass. of *sing.*

SUNK. The pret. and part. pass. of *sink.*

SU'NLESS. *a.* (from *sun.*) Wanting sun; wanting warmth (*Thomson*).

SU'NLIKE. *a.* (*sun* and *like.*) Resembling the sun (*Cheyne*).

SU'NNY. *a.* (from *sun.*) 1. Resembling the sun; bright (*Shakspeare*). 2. Exposed to the sun; bright with the sun (*Addison*). 3. Coloured by the sun (*Shakspeare*).

SU'NRISE. SUNRI'SING. *s.* (*sun* and *rise.*) Morning; the appearance of the sun (*Bentley*).

SU'NSET. *s.* (*sun* and *set.*) Close of the day; evening (*Pope*).

SU'NSHINE. *s.* (*sun* and *shine.*) Action of the sun; place where the heat and lustre of the sun are powerful (*Clarendon*).

SU'NSHINY. *a.* (from *sunshine.*) 1. Bright with the sun (*Boyle*). 2. Bright like the sun (*Spenser*).

SUOVETAURILIA, a sacrifice among the Romans, which consisted of the immolation of a sow (*sus*), a sheep (*ovis*), and a bull (*taurus*), whence the name. It was generally observed every fifth year.

To SUP. *v. a.* (ꞅupan, Sax. *soepen*, Dutch.) To drink by mouthfuls; to drink by little at a time; to sip (*Crashaw*).

To Sup. *v. n.* (*souper*, French.) To eat the evening meal (*Dryden*).

To Sup. *v. a.* To treat with supper (*Chapman*).

Sup. *s.* (from the verb.) A small draught; a mouthful of liquor (*Swift*).

SU'PER, in composition, notes either more than another, or more than enough, or on the top.

SU'PERABLE. *a.* (*superabilis*, Lat.) Conquerable; such as may be overcome.

SU'PERABLENESS. *s.* (from *superable.*) Quality of being conquerable.

To SUPERABO'UND. *v. n.* (*super* and *abound.*) To be exuberant; to be stored with more than enough (*Howel*).

SUPERABU'NDANCE. *s.* (*super* and *abundance.*) More than enough; great quantity (*Woodward*).

SUPERABU'NDANT. *a.* (*super* and *abundant.*) Being more than enough (*Swift*).

SUPERABU'NDANTLY. *ad.* More than sufficiently (*Cheyne*).

To SUPERA'DD. *v. n.* (*superaddo*, Latin.) To add over and above; to join any thing extrinsic (*South*).

SUPERADDI'TION. *s.* (*super* and *addition.*) 1. The act of adding to something else (*More*). 2. That which is added (*Hammond*).

SUPERADVE'NIENT. *a.* (*superadveniens*, Lat.) 1. Coming to the increase or assistance of something (*More*). 2. Coming unexpectedly.

To SUPERA'NNUATE. *v. a.* (*super* and *annus*, Latin.) To impair or disqualify by age or length of life (*Brown*).

To Supera'nnuate. *v. n.* To last beyond the year: not in use (*Bacon*).

SUPERANNUA'TION. *s.* (from *superannuate.*) The state of being disqualified by years.

SUPE'RB. *a.* (*superbus*, Latin.) Grand; pompous; lofty; august; stately; magnificent.

Superb lily. See Gloriosa.

SUPE'RBLY. *ad.* In a superb manner.

SUPERBUS, in myology. See Rectus superior oculi.

SUPERCA'RGO. *s.* (*super* and *cargo.*) An officer in the ship whose business is to manage the trade (*Pope*).

SUPERCELE'STIAL. *a.* (*super* and *celestial.*) Placed above the firmament (*Raleigh*).

SUPERCI'LIOUS. *a.* (from *supercilium*, Latin.) Haughtily; dogmatically; dictatorial; arbitrary; despotic (*South*).

SUPERCI'LIOUSLY. *ad.* Haughtily; dogmatically; contemptuously (*Clarendon*).

SUPERCI'LIOUSNESS. *s.* (from *supercilious.*) Haughtiness; contemptuousness.

SUPERCILIUM, the eyebrow. See Eyebrow.

Supercilium veneris. The milfoil or yarrow was once so termed. See Millefolium.

SUPERCONCE'PTION. *s.* (*super* and *conception.*) A conception admitted after another conception (*Brown*).

SUPERCO'NSEQUENCE. *s.* (*super* and *consequence.*) Remote consequence (*Brown*).

SUPERCRE'SCENCE. *s.* (*super* and *cresco*, Lat.) That which grows upon another growing thing (*Brown*).

SUPERDECOMPOUND. See Supradecompound.

SUPERE'MINENCE, Supere'minency. *s.* (*super* and *emineo*, Latin.) Uncommon degree of eminence (*Ayliffe*).

SUPERE'MINENT. *a.* (*super* and *eminent.*) Eminent in a high degree (*Hooker*).

SUPERE'MINENTLY. *ad.* In the most eminent manner.

To SUPERE'ROGATE. *v. n.* (*super* and *erogatio*, Latin.) To do more than duty requires.

SUPEREROGA'TION. *s.* (from *supererogate.*) Performance of more than duty requires (*Tillotson*).

SUPERE'ROGATORY. *a.* (from *supererogate.*) Performed beyond the strict demands of duty (*Howel*).

SUPEREXALTA'TION. *s.* (*super* and *exalt.*) Elevation above the common rate (*Holyday*).

SUPERE'XCELLENT. *a.* (*super* and *excellent.*) Excellent beyond common degrees of excellence (*Decay of Piety*).

SUPEREXCRE'SCENCE. *s.* (*super* and *excrescence.*) Something superfluously growing (*Wiseman*).

To SUPERFE'TATE. *v. n.* (*super* and *fœtus*, Latin.) To conceive after conception (*Grew*).

SUPERFETATION. (*superfetatio*, from *super*, above or upon, and *fœtus*, a fœtus.) The impregnation of a woman already pregnant.

SU'PERFICE. *s.* (*superficie*, Fr. *superficies*, Latin.) Outside; surface (*Dryden*).

SUPERFI'CIAL. *a.* (*superficial*, French.) 1. Lying on the surface; not reaching below the surface (*Bentley*). 2. Shallow; contrived to cover something (*Shakspeare*). 3. Shallow; not profound; smattering; not learned (*Dryden*).

SUPERFICIA'LITY. *s.* (from *superficial.*) The quality of being superficial (*Brown*).

SUPERFI'CIALLY. *ad.* (from *superficial.*) 1. On the surface; not below the surface. 2. Without penetration; without close heed (*Milton*). 3. Without going deep; without searching to the bottom of things (*Shakspeare*).

SUPERFI'CIALNESS. *s.* (from *superficial.*) 1. Shallowness; position on the surface. 2. Slight knowledge; false appearance; show without substance.

SUPERFICIES, or Surface, in geometry, the outside or exterior face of any body. This is considered as having the two dimensions of length and breadth only, but no thickness; and therefore it makes no part of the substance or solid content or matter of the body.

The terms or bounds or extremities of a superficies, are lines; and superficies may be considered as generated by the motions of lines.

Superficies are either rectilinear, curvilinear, plane, concave, or convex.

Rectilinear superficies, is that which is bounded by right lines.

Curvilinear superficies, is bounded by curve lines.

Plane superficies, is that which has no inequality in it, nor risings, nor sinkings, but lies evenly and straight throughout, so that a right line may wholly coincide with it in all parts and directions.

Convex superficies, is that which is curved and rises outwards.

Concave superficies, is curved and sinks inward.

The measure or quantity of a surface, is called the area of it. And the finding of this measure or area, is sometimes called the quadrature of it, meaning the reducing it to an equal square, or to a certain number of smaller squares. For all plane figures, and the surfaces of all bodies, are measured by squares; as square inches, or square feet, or square yards, &c; that is, squares whose sides are inches, or feet, or yards, &c.

SUPERFI′NE. *a.* (*super* and *fine.*) Eminently fine (*L'Estrange*).

SUPERFLUA POLYGAMIA. Superfluous polygamy. In botany, the name of the second order in the class syngenesia; wherein the florets of the disk are hermaphrodite and fertile; and the florets of the ray, though female only, are also fertile.

SUPERFLU′ENCE. *s.* (*super* and *fluo,* Latin.) More than is necessary (*Hammond*).

SUPERFLU′ITANCE. *s.* (*super* and *fluito,* Latin.) The act of floating above (*Brown*).

SUPERFLU′ITANT. *a.* (*superfluitans,* Latin.) Floating above (*Brown*).

SUPERFLU′ITY. *s.* (*superfluité,* French.) More than enough; plenty beyond use or necessity (*Suckling*).

SUPE′RFLUOUS. *a.* (*super* and *fluo,* Lat. *superflu,* Fr.) Exuberant; more than enough; unnecessary (*Hooker. Roscommon*).

SUPE′RFLUOUSNESS. *s.* (from *superfluous.*) The state of being superfluous.

SU′PERFLUX. *s.* (*super* and *fluxus,* Lat.) That which is more than is wanted (*Shaks.*).

SUPERHU′MAN. *a.* (*super* and *humanus,* Latin.) Above the nature or power of man.

SUPERIMPREGNA′TION. *s.* (*super* and *impregnation.*) Superconception; superfetation.

SUPERINCU′MBENT. *s.* (*super* and *incumbens,* Lat.) Lying on the top of something else (*Woodward*).

To SUPERINDU′CE. *v. a.* (*super* and *induco,* Latin.) 1. To bring in as an addition to something else (*South*). 2. To bring on as a thing not originally belonging to that on which it is brought (*Locke*).

SUPERINDU′CTION. *s.* (from *super* and *induce.*) The act of superinducing (*South*).

SUPERINJE′CTION. *s.* (*super* and *injection.*) An injection succeeding another.

SUPERINSTITU′TION. *s.* (*super* and *institution.* In law.) One institution upon another.

To SUPERINTE′ND. *v. a.* (*super* and *intend.*) To oversee; to overlook; to take care of others with authority (*Watts*).

SUPERINTE′NDENCE. Superinte′ndency. *s.* (from *super* and *intend.*) Superiour care; the act of overseeing with authority (*Grew*).

SUPERINTE′NDENT. *s.* (*superintendant,* French; from *superintend.*) One who overlooks others authoritatively (*Addison*).

SUPERIOR. See Superiour.

Superior (Lake), a lake of North America, so called from its being the largest on that continent. According to the French charts it is 1500 miles in circumference. It contains many islands; two of them very large, especially Isle Royale, which is 100 miles long, and, in many places, 40 broad. The Indians suppose these islands to be the residence of the Great Spirit. Upward of 30 rivers enter this lake, some of which are of considerable size. It abounds with trout and sturgeon. Storms affect this lake as much as they do the Atlantic ocean. It discharges its waters from the S.E. corner, through the straits of St. Marie, into Lake Huron.

SUPERIO′RITY. *s.* (from *superiour.*) Pre-eminence; the quality of being greater or higher than another in any respect (*Stillingfleet*).

SUPE′RIOUR. *a.* (*superieur,* Fr. *superior,* Latin.) 1. Higher; greater in dignity or excellence; preferable or preferred to another (*Taylor*). 2. Upper; higher locally (*Newton*). 3. Free from emotion or concern; unconquered; unaffected (*Milton*).

Supe′riour. *s.* One more excellent or dignified than another (*Addison*).

SUPERLA′TION. *s.* (*superlatio,* Latin.) Exaltation of any thing beyond truth or propriety (*Ben Jonson*).

SUPE′RLATIVE. *a.* (*superlativus,* Latin.) 1. Implying or expressing the highest degree (*Watts*). 2. Rising to the highest degree. See Grammar.

SUPE′RLATIVELY. *ad.* 1. In a manner of speech expressing the highest degree (*Bacon*). 2. In the highest degree (*Bentley*).

SUPE′RLATIVENESS. *s.* (from *superlative.*) The state of being in the highest degree.

SUPERLU′NAR. *a.* (*super* and *luna,* Lat.) Not sublunary; placed above the moon; not of this world (*Pope*).

SUPE′RNAL. *a.* (*supernus,* Lat.) 1. Having a higher position; locally above us (*Raleigh*). 2. Relating to things above; placed above; celestial; heavenly (*Shakspeare*).

SUPERNA'TANT. *a.* (*supernatans*, Lat.) Swimming above (*Boyle*).

SUPERNATA'TION. *s.* (from *supernato*, Latin.) The act of swimming on the top of any thing (*Bacon*).

SUPERNA'TURAL. *a.* (*super* and *natural.*) Being above the powers of nature (*Tillotson*).

SUPERNA'TURALLY. *ad.* In a manner above the course or power of nature (*South*).

SUPERNU'MERARY. *a.* (*supernumeraire*, Fr.) Being above a stated, a necessary, an usual, or a round number (*Holder*).

SU'PERPLANT. *s.* (*super* and *plant.*) A plant growing upon another plant (*Bacon*).

To SUPERPO'NDERATE. *v. a.* (*super* and *pondero*, Lat.) To weigh over and above.

SUPERPROPO'RTION. *s.* (*super* and *proportio*, Latin.) Overplus of proportion (*Digby*).

SUPERPURGA'TION. *s.* (*superpurgation*, French.) More purgation than enough (*Wiseman*).

SUPERREFLE'XION. *s.* (*super* and *reflexion.*) Reflexion of an image reflected (*Bacon*).

SUPERSA'LIANCY. *s.* (*super* and *salio*, Latin.) The act of leaping upon any thing (*Brown*).

To SUPERSCRI'BE. *v. a.* (*super* and *scribo*, Lat.) To inscribe upon the top or outside (*Addison*).

SUPERSCRI'PTION. *s.* (*super* and *scriptio*, Latin.) 1. The act of superscribing. 2. That which is written on the top or outside (*Suckling*).

To SUPERSE'DE. *v. a.* (*super* and *sedeo*, Latin.) To make void or inefficacious by superiour power; to set aside (*Bentley*).

SUPERSEDEAS, a writ that lies in a great many cases, and signifies in general, a command to stay proceedings, on good cause shewn, which ought otherwise to proceed. By a supersedeas, the doing of a thing, which might otherwise have been lawfully done, is prevented; or a thing that has been done, is (notwithstanding it was done in a due course of law) thereby made void. 4 Bac. Abr. 667.

A supersedeas is either expressed or implied; an express supersedeas is sometimes by writ, sometimes without a writ; where it is by writ, some person to whom the writ is directed is thereby commanded to forbear the doing something therein mentioned; or if the thing has been already done, to revoke, as that can be done, the act. 4 Bac. Abr. 667.

SUPERSE'RVICEABLE. *a.* (*super* and *serviceable.*) Over officious (*Shakspeare*).

SUPERSTI'TION. *s.* (*superstitio*, Latin.) 1. Unnecessary fear or scruples in religion; religion without morality (*Dryden*). 2. Rite or practice proceeding from scrupulous or timorous religion (*Law*). 3. False religion; reverence of beings not proper objects of reverence (*Acts*). 4. Over-nicety; exactness; too scrupulous.

Hence it appears that the word superstition, like many others, is very indefinitely employed. We apply it to the idolatry of the heathens; we apply it also to the Jews, who made the will of God of no effect by their traditions, and substituted ceremonies in place of the religion of their fathers. We say also that Christians are guilty of superstition; the Roman Catholics, who believe in transubstantiation and in the efficacy of prayers to saints; and those Protestants who esteem baptism and the Lord's supper, and the punctual performance of other ceremonies, without regard to morality, as sufficient to insure salvation. Those persons also are reckoned superstitious who believe, without any evidence, that prophecies are still uttered by the divine inspiration, and that miracles are still performed. The word is also extended to those who believe in witchcraft, magic, and apparitions, or that the divine will is declared by omens or augury; that the fortune of individuals can be affected by things indifferent, by things deemed lucky or unlucky, or that diseases can be cured by words, charms, and incantations.

SUPERSTI'TIOUS. *a.* (*superstitiosus*, Lat.) 1. Addicted to superstition; full of idle fancies or scruples with regard to religion (*Milton*). 2. Over-accurate; scrupulous beyond need.

SUPERSTI'TIOUSLY. *ad.* 1. In a superstitious manner; with erroneous religion (*Bacon*). 2. With too much care (*Watts*).

To SUPERSTRA'IN. *v. a.* (*super* and *strain.*) To strain beyond the just stretch (*Bacon*).

To SUPERSTRU'CT. *v. a.* (*superstructus*, Latin.) To build upon any thing (*Hammond*).

SUPERSTRU'CTION. *s.* (from *superstruct.*) An edifice raised on any thing (*Den.*).

SUPERSTRU'CTIVE. *a.* (from *superstruct.*) Built upon something else (*Hammond*).

SUPERSTRU'CTURE. *s.* (*super* and *structure.*) That which is raised or built upon something else (*Tillotson*).

SUPERSUBSTA'NTIAL. *a.* (*super* and *substantial.*) More than substantial.

SUPERVACA'NEOUS. *a.* (*supervacaneus*, Latin.) Superfluous; needless; unnecessary; serving to no purpose.

SUPERVACA'NEOUSLY. *ad.* Needlessly.

SUPERVACA'NEOUSNESS. *s.* (from *supervacaneous.*) Needlessness (*Bailey*).

To SUPERVE'NE. *v. n.* (*supervenio*, Lat.) To come as an extraneous addition (*Fell*).

SUPERVE'NIENT. *a.* (*superveniens*, Lat.) Added; additional (*Hammond*).

SUPERVE'NTION. *s.* (from *supervene.*) The act of supervening.

To SUPERVI'SE. *v. a.* (*super* and *visus*, Latin.) To overlook; to oversee; to intend (*Congreve*).

SUPERVI'SOR. *s.* (from *supervise.*) An overseer; an inspector (*Watts*).

To SUPERVI'VE. *v. n.* (*super* and *vivo*, Latin.) To overlive; to outlive (*Clarke*).

SUPINA'TION. *s.* (*supination*, Fr.) The act of lying with the face upward.

It denotes also the act of turning the palm of the hand upwards, by rotating the radius upon the ulna.

SUPINA'TOR. (from *supinus*, upwards.) A name given to those muscles which turn the hand upwards.

Supinator longus. See Supinator radii longus.

S. radii brevis. This small muscle, which is tendinous externally, is situated at the upper part of the fore arm under the supinator longus, the extensor carpi radialus brevis, the extensor carpi ulnaris, the extensor digitorum communis, and the extensor minimi digiti.

It arises tendinous from the lower and anterior part of the outer condyle of the os humeri, and tendinous and fleshy from the outer edge and posterior surface of the ulna, adhering firmly to the ligament that joins the radius to that bone. From these origins its fibres descend forwards and inwards, and are inserted into the upper, inner, and anterior part of the radius around the cartilaginous surface upon which slides the tendon of the biceps, and likewise into a ridge that runs downwards and outwards below this surface.

This muscle assists in the supination of the hand by rolling the radius outwards.

S. radii longus. Supinator longus of Albinus, Winslow, and Douglas. A long flat muscle, covered by a very thin tendinous fascia, and situated immediately under the integuments along the outer convex surface of the radius. It arises, by very short tendinous fibres, from the anterior surface and outer ridge of the os humeri, about two or three inches above its external condyle, between the brachialis internus and the triceps brachii; and likewise from the anterior surface of the external intermuscular membrane, or ligament, as it is called. About the middle of the radius, its fleshy fibres terminate in a flat tendon, which is inserted into the inner side of the inferior extremity of the radius, near the root of its styloid process.

This muscle not only assists in rolling the radius outwards, and turning the palm of the hand upwards, on which account Riolanus first gave it the name of supinator, but it likewise assists in pronation, and in bending the fore arm.

SUPI'NE. *a.* (*supinus*, Latin.) 1. Lying with the face upward; opposed to *prone* (*Dryden*). 2. Leaning backward with exposure to the sun (*Dryden*). 3. Negligent; careless; indolent; drowsy; thoughtless; inattentive (*Woodward*).

Su'pine. *s.* (*supinum*, Latin.) In grammar, a term signifying a particular kind of verbal noun.

SUPI'NELY. *ad.* (from *supine*.) 1. With the face upward. 2. Drowsily; thoughtlessly; indolently (*Prior*).

SUPI'NENESS. *s.* (from *supine*.) 1. Posture with the face upward. 2. Drowsiness; carelessness; indolence (*Swift*).

SUPI'NITY. *s.* (from *supine*.) 1. Posture of lying with the face upward. 2. Carelessness; indolence; thoughtlessness (*Brown*).

SUPPEDA'NEOUS. *a.* (*sub* and *pes*, Lat.) Placed under the feet (*Brown*).

SU'PPER. *s.* (*souper*, French. See Sup.) The last meal of the day; the evening repast (*Shakspeare*).

Supper of the Lord. See Sacrament and Eucharist.

SU'PPERLESS. *a.* (from *supper*.) Wanting supper; fasting at night (*Pope*).

To SUPPLA'NT. *v. a.* (*supplanter*, Fr.) 1. To trip up the heels (*Milton*). 2. To displace by stratagem; to turn out (*Sidney*). 3. To displace; to overpower; to force away (*Shakspeare*).

SUPPLA'NTER. *s.* (from *supplant*.) One that supplants; one that displaces.

SU'PPLE. *a.* (*souple*, French.) 1. Pliant; flexible (*Milton*). 2. Yielding; soft; not obstinate (*Dryden*). 3. Flattering; fawning; bending (*Addison*). 4. That makes supple (*Shakspeare*).

To Su'pple. *v. a.* (from the adjective.) 1. To make pliant; to make soft; to make flexible (*Arbuthnot*). 2. To make compliant (*Locke*).

To Su'pple. *v. n.* To grow soft; to grow pliant (*Dryden*).

Supple, in the manage. To supple a horse, is to make him bend his neck, shoulders, and sides, and to render all the parts of his body more pliable.

Supple jack, in botany. See Rhamnus.

SU'PPLEMENT. *s.* (*supplementum*, Lat.) Addition to any thing by which its defects are supplied (*Rogers*).

Supplement of an arch, in geometry, or trigonometry, is the number of degrees that it wants of being an entire semicircle; as a complement, signifies what an arch wants of being a quadrant.

SUPPLEME'NTAL. Suppleme'ntary. *a.* (from *supplement*.) Additional; such as may supply the place of what is lost (*Clarendon. Decay of Piety*).

SU'PPLENESS. *s.* (*souplesse*, Fr.; from *supple*.) 1. Pliantness; flexibility; readiness to take any form (*Bacon*). 2. Readiness of compliance; facility (*Temple*).

SU'PPLETORY. *a.* (from *suppleo*, Lat.) Brought in to fill up deficiencies.

Su'ppletory. *s.* (*suppletorium*, Latin. That which is to fill up deficiencies (*Hammond*).

SU'PPLIANT. *a.* (*suppliant*, French.) Entreating; beseeching; precatory; submissive (*Prior*).

Su'ppliant. *s.* (from the adjective.) An humble petitioner (*Dryden*).

SUPPLIES, the sums granted by parliament for defraying the public expenditure for the current year. The known or probable amount of the different branches of the year's expenses is stated to the house of commons in a committee of supply, by the chancellor of the exchequer; and after they have been voted by the committee are formally granted by an act of parliament. The granting of the annual supplies as well as permanent taxes is a peculiar privilege of the house of commons, who never permit any alteration or amendment to be made by the lords, in the bills passed for this purpose.

The grants of parliament were originally considered merely as temporary aids, to assist the sovereign in defraying such extraordinary expenses as he was subject to for the benefit of the public: and unless the commons happened to entertain at the time any particular jealousy of the crown and its ministers, the sum granted was commonly left entirely to their disposal. But after the restoration of Charles II. not only more frequent grants were demanded, but, in consequence of the poverty to which the crown was reduced, parliamentary grants had become really necessary almost every year. It was impossible, however, for the parliament, distrusting not only Charles's economy, but his regard for the interest of his kingdoms, to vest considerable sums of money in such unsafe and improvident hands: it was, therefore, thought requisite to specify the purposes for which each sum was voted. Thus, appropriating clauses came to be introduced, which practice has continued ever since; and at the commencement of each session, an account is presented of the disposition of the grants of the preceding session, shewing how much has been actually paid to each branch of the public service, what remains unpaid of the sums appropriated, with the funds for discharging the same, and the surplus or deficiency of the ways and means.

SU'PPLICANT. *s.* (from *supplicate.*) One that entreats or implores with great submission; an humble petitioner (*Rogers*).

To SU'PPLICATE. *v. a.* (*supplico*, Lat.) To implore; to entreat; to petition submissively and humbly (*Addison*).

SUPPLICA'TION *s.* (from *supplicate.*) 1. Petition humbly delivered; entreaty (*Shakspeare*). 2. Petitionary worship; the adoration of a suppliant or petitioner (*Stillingfleet*).

To SUPPLY'. *v. n.* (*suppleo*, Lat.) 1. To fill up as any deficiencies happen (*Spenser*). 2. To give something wanted; to yield; to afford (*Dryden*). 3. To relieve with something wanted (*Shakspeare*). 4. To serve instead of (*Waller*). 5. To give or bring, whether good or bad (*Prior*). 6. To fill any room made vacant (*Dryden*). 7. To accommodate; to furnish (*Wotton*).

SUPPLY'. *s.* (from the verb.) Relief of want; cure of deficiencies (*Corinthians*).

To SUPPO'RT. *v. a.* (*supporter*, French; *supportare*, Italian.) 1. To sustain; to prop; to bear up (*Dryden*). 2. To endure any thing painful without being overcome (*Milton*). 3. To endure; to bear (*Dryden*). 4. To sustain; to keep from fainting (*Milton*).

SUPPO'RT. *s.* (*support*, French.) 1. Act or power of sustaining (*Locke*). 2. Prop; sustaining power. 3. Necessaries of life. 4. Maintenance; supply.

SUPPORT, in botany. See FULCRE.

SUPPO'RTABLE. *a.* (*supportable*, Fr.) Tolerable; to be endured (*Pope*).

SUPPO'RTABLENESS. *s.* (from *supportable.*) The state of being tolerable.

SUPPO'RTANCE. SUPPORTA'TION. *s.* (from *support.*) Maintenance; support: obsolete (*Shakspeare. Bacon*).

SUPPORTED, in heraldry, a term applied to the uppermost quarters of a shield when divided into several quarters, these seeming as it were supported or sustained by those below. The chief is said to be supported when it is of two colours, and the upper colour takes up two-thirds of it. In this case it is supported by the colour underneath.

SUPPO'RTER. *s.* (from *support.*) 1. One that supports (*Locke*). 2. Prop; that by which any thing is borne up from falling (*Camd.*). 3. Sustainer; comforter (*South*). 4. Maintainer; defender (*South*).

SUPPORTERS, in heraldry, figures in an achievement placed by the side of the shield, and seeming to support or hold up the same. Supporters are chiefly figures of beasts: figures of human creatures, for the like purpose, are properly called tenants. Some make another difference between tenant and supporter: when the shield is borne by a single animal, it is called tenant; when by two, they are called supporters. The figures of things inanimate sometimes placed aside of escutcheons, but not touching or seeming to bear them, though sometimes called supporters, are more properly cotises. The supporters of the British arms are a lion and an unicorn. In England, none under the degree of a banneret are allowed supporters, which are restrained to those called the high nobility. The Germans permit none but princes and noblemen of rank to bear them; but among the French formerly the use of them was more promiscuous.

SUPPO'SABLE. *a.* (from *suppose.*) That may be supposed (*Hammond*).

SUPPO'SAL. *s.* (from *suppose.*) Position without proof; imagination; belief (*Shaks.*).

To SUPPO'SE. *v. a.* (*supposer*, French.) 1. To lay down without proof; to advance by way of argument or illustration, without maintaining the position (*Locke*). 2. To admit without proof (*Tillotson*). 3. To imagine; to believe without examination (*Milton*). 4. To require as previous (*Hale*). 5. To make reasonably supposed. 6. To put one thing by fraud in the place of another.

SUPPO'SE. *s.* Supposition; position without proof; unevidenced conceit (*Dryden*).

SUPPO'SER. *s.* (from *suppose.*) One that supposes (*Shakspeare*).

SUPPOSI'TION. *s.* (*supposition*, French.) Position laid down; hypothesis; imagination yet unproved (*Tillotson*).

SUPPOSITI'TIOUS. *a.* (*supposititius*, Lat.) 1. Not genuine; put by a trick into the place or character belonging to another (*Addison*). 2. Imaginary; not real (*Woodward*).

SUPPOSITI'TIOUSNESS. *s.* (from *supposititious.*) State of being counterfeit.

SUPPO'SITIVELY. *ad.* (from *suppose.*) Upon supposition (*Hammond*).

SUPPOSITORIUM. (from *sub*, under, and *pone*, to put.) A suppository, i. e. a substance to put into the rectum, there to remain and dissolve gradually.

To SUPPRE'SS. *v. a.* (*suppressus*, Latin.) 1. To crush; to overpower; to overwhelm; to subdue; to reduce from any state of activity or commotion (*Davies*). 2. To conceal; not to tell (*Broome*). 3. To keep in; not to let out (*Shakspeare*).

SUPPRESSED MENSES. See AMENORRHŒA.

SUPPRE'SSION. *s.* (*suppression*, French; *suppressio*, Latin.) 1. The act of suppressing. 2. Not publication (*Pope*).

SUPPRESSION, in grammar and rhetoric, denotes an omission of certain words in a sentence, which yet are necessary to full and perfect construction: as, "I come from my father's;" that is, "from my father's house." Suppression is a figure of speech very frequent in our language, chiefly used for brevity and elegance. Some rules relating thereto are as follow: 1. Whenever a word comes to be repeated in a sentence oftener than once, it is to be suppressed. Thus we say, "This is my master's horse," not "This horse is my master's horse." 2. Words that are necessarily supplied may be suppressed: and, 3. All words that use and custom suppress in other languages are also to be suppressed in English, unless there be particular reasons for the contrary.

SUPPRE'SSOR. *s.* (from *suppress.*) One that suppresses, crushes, or conceals.

To SU'PPURATE. *v. n.* (*suppurer*, Fr.) To generate pus or matter (*Arbuthnot*).

To SU'PPURATE. *v. n.* To grow to pus.

SUPPURATION. (*suppuratio*, from *suppuro*, to suppurate.) That curative or morbid action by which pus is deposited in inflammatory tumours. See PUS.

SU'PPURATIVE. *a.* (*suppuratif*, French.) Digestive; generating matter.

SUPPUTA'TION. *s.* (*supputation*, Fr.; *supputo*, Latin.) Reckoning; account; calculation; computation (*West*).

To SUPPU'TE. *v. a.* (from *supputo*, Lat.) To reckon; to calculate.

SU'PRA. (Lat.) In composition, signifies above or before.

SUPRA COSTALES, in myology, a portion of the intercostal muscles. See INTERCOSTAL MUSCLES.

SUPRA-DECOMPOSITE LEAF, in botany, a super-decompound leaf. Cum petiolus aliquoties divisus adnectit plurima foliola. When a petiole divided several times connects many leaflets; each part forming a decompound leaf: as in pimpinella glauca, ranunculus rutæfolius. Tergeminate, triternate, and tripinnate leaves are species of this; and are explained in their proper places.

SUPRA-FOLIACEOUS, in botany, applied to the peduncle and flower. A peduncle or flower inserted into the stem above the leaf, or petiole, or axil.

SUPRA-LAPSARIANS, in theology, persons who hold that God, without any regard to the good or evil works of men, has resolved, by an eternal decree, *supra lapsum*, antecedently to any knowledge of the fall of Adam, and independently of it, to save some and to damn others; or, in other words, that God intended to glorify his justice in the condemnation of some, as well as his mercy in the salvation of others; and for that purpose decreed that Adam should necessarily fall, and by that fall bring himself and all his offspring into a state of everlasting condemnation. These are also called antelapsaries, and are opposed to sublapsaries and infralapsaries. According to the supralapsarians, the object of predestination is *homo creabilis et labilis*; and, according to the sublapsarians and infralapsarians, *homo creatus et lapsus*.

SUPRA-SPINATUS. (*musculus supra-spinatus.*) In myology. This muscle, which was first so named by Riolanus, from its situation, is of considerable thickness, wider behind than before, and fills the whole of the cavity or fossa that is above the spine of the scapula.

It arises fleshy from the whole of the base of the scapula that is above its spine, and likewise from the spine itself, and from the superior costa. Opposite to the basis of the coracoid process, it is found beginning to degenerate into a tendon, which is at first covered by fleshy fibres, and then passing under the acromion, adheres to the capsular ligament of the os humeri, and is inserted into the upper part of the large tuberosity at the head of the os humeri.

This muscle is covered by a thin fascia, which adheres to the upper edge and superior part of the basis, as well as to the upper edge of the spine of the scapula.

The principal use of the supra-spinatus seems to be to assist in raising the arm upwards; at the same time, by drawing the capsular ligament upwards, it prevents it from being pinched between the head of the os humeri and that of the scapula. It may likewise serve to move the scapula upon the humerus.

SUPRAVU'LGAR. *a.* (*supra* and *vulgar.*) Above the vulgar (*Collier*).

SUPRE'MACY. *s.* (from *supreme.*) Highest place; highest authority; state of being supreme (*Rogers*).

SUPRE'ME. *a.* (*supremus*, Lat.) 1. Highest in dignity; highest in authority (*Hooker*). 2. Highest; most excellent (*Dryden*).

SUPRE'MELY. *ad.* (from *supreme.*) In the highest degree (*Pope*).

SUR. (*sur*, Fr.) In composition, means *upon*, or *over and above*.

SURADDI'TION. *s.* (*sur* and *addition.*) Something added to the name (*Shakspeare*).

SU'RAL. *s.* (from *sura*, Lat.) Being in the calf of the leg (*Wiseman*).

SU'RANCE. *s.* (from *sure.*) Warrant; security; assurance (*Shakspeare*).

SURAT, a city and seaport of the Deccan of Hindustan. It is said to have 200,000 inhabitants, and its trade is very considerable. In this city are many different religions; for there are Mahometans of several sects, many sorts of Gentoos, and Jews and Christians of various denominations. The Mahometans at Surat are not, by far, so strict as they are in Arabia, or in other Turkish countries, nor are the distinctions of tribes among the Hindus who reside here strictly observed. These Hindus are a set of industrious sober people, and of a most surprising honesty. The Hindu women assist their husbands in earning their bread, and keep themselves so clean, that the European women, who come to India, are obliged to follow their example, or run the risk of losing their husbands' affections. When a child is born, a bramin is to declare, by astrological rules, whether the child is come into the world in a lucky hour or not. This done, he hangs a thin string over the shoulder of a boy, who wears this distinctive mark of his nation all his lifetime. If a banian, or common Hindu, intends to give his child in marriage, which is done when the child is about six or eight years old, a bramin is to fix the times when the father is to ask for the bride, and when the wedding is to be celebrated. In the mean while, the children remain in the houses of their parents till they arrive at the age of maturity. The bramins order and announce also the holy days. Every banian is obliged, every morning after washing and bathing himself, to have a kind of seal impressed on his forehead, by a bramin; though this is the office of inferior bramins only. One thing singular in Surat is, that, though there is no hospital for human beings, there is an extensive establishment of this nature for sick or maimed animals. When the Europeans turn out an old horse, or any other domestic animal to perish, as useless, the Hindus voluntarily assume the care of it, and place it in this house, which is full of infirm decrepid cows, sheep, rabbits, hens, pigeons, &c. The charitable Hindus keep a physician to look after these animals. The country round Surat is fertile, except toward the sea, which is sandy and barren. Before the English East India Company obtained possession of Bombay, the presidency of their affairs on the coast of Malabar was at Surat; and they had a factory established there. Even after the presidency was transferred to Bombay, the factory was continued. The Great Mogul had then an officer here, who was styled his admiral, and received a revenue called the tanka, of the annual value of three lacks of rupees, arising from the rents of adjacent lands, and the taxes levied at Surat. The tyranny of this officer toward the merchants induced the East India Company, in 1759, to fit out an armament, which dispossessed the admiral of the castle; and, soon after, the possession of this castle was confirmed to them by the court of Delhi. They obtained, moreover, the appointment of the post of admiral, and were constituted receivers of the tanka, by which their authority in this place became supreme. Surat is situate on the confines of Guzerat, 20 miles up the river Tapty, and 177 N. of Bombay. Lon. 72. 48 E. Lat. 21. 10 N.

To SURBA′TE. *v. a.* (*sobatir*, French.) To bruise and batter the feet with travel; to harass; to fatigue (*Clarendon*).

SURBATING, in the manage. A horse is said to be surbated, when the sole is worn out, bruised, or spoiled by any accident, as by bad shoeing, especially when the shoes lie flat on the feet; or when the horse goes too long barefoot; as also, by travelling on hard ways, or among dry hot sand in hot weather, which dries the hoof, whereby the sole, becoming hard, presses upon the soft parts beneath it. If a horse be surbated by bad shoeing, you may know the part that is affected, by the thinness of the shoe, where it presses most; and therefore it ought to be pared deepest in that part, before another is put on: but if the shoe is not in the fault, it may be known that he is surbated by his continual hitching and moving: but by feeling his hoofs, you may observe them both very hot and dry.

Gibson says, the cure is very easy, before it becomes attended with other accidents, and may be performed only by stopping up the feet with cow's dung and vinegar. Some use only hog's grease, hot, thickened with bran; and others make use of vinegar and soot boiled together: but nothing will be more efficacious, in case it be troublesome, than first softening the sole with the application of unctuous things, and after that pouring a mixture of warm pitch and tar upon the sole.

To SURCEA′SE. *v. n.* (*sur* and *cesser*, Fr.) 1. To be at an end; to stop; to cease; to be no longer in use or being (*Donne*). 2. To leave off; to refrain finally (*Hooker*).

To Surcea′se. *v. a.* To stop; to put an end to: obsolete (*Spenser*).

Surcea′se. *s.* Cessation; stop (*Hooker*).

To SURCHA′RGE. *v. a.* (*surcharger*, Fr.) To overload; to overburden (*Knolles*).

Surcha′rge. *s.* (*surcharge*, French; from the verb.) Overburden; more than can be well born (*L'Estrange*).

SURCHA′RGER. *s.* (from *surcharge*.) One that overburdens.

SURCI′NGLE. *s.* (*sur* and *cingulum*, Lat.) 1. A girth with which the burden is bound upon a horse. 2. The girdle of a cassock (*Marvel*).

SU′RCLE. *s.* (*surculus*, Latin.) A shoot; a twig; a sucker (*Brown*).

SU′RCOAT. *s.* (*surcot*, old Fr.) A short coat worn over the rest of the dress (*Dryden*).

SURCULE. (*surculus*, a little branch or twig. Quod in ramis simplex assurgit tenerum & exile.) In botany, a shoot. It is probably a diminutive from *surus* or *surrus*, an old word for a large branch, such as was fit to make a stake or palisade of. The original word was probably *surcus*, from *surgo*, which was anciently *surco*. Linnéus puts *surculus* for a branchlet of moss.

SURD. *a.* (*surdus*, Latin.) 1. Deaf; wanting the sense of hearing. 2. Unheard; not perceived by the ear. 3. Not expressed by any term.

SURD, in arithmetic and algebra, denotes any number or quantity that is incommensurable to unity: otherwise called an irrational number or quantity.

The square roots of all numbers, except 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, &c. (which are the squares of the integer numbers, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, &c.) are incommensurables: and after the same manner the cube roots of all numbers but of the cubes of 1, 2, 3, 4, 5, 6, &c. are incommensurables: and quantities that are to one another in the proportion of such numbers must also have their square roots, or cube roots, incommensurable.

The roots, therefore, of such numbers, being incommensurable, are expressed by placing the proper radical sign over them: thus, $\sqrt[2]{2}$, $\sqrt[2]{3}$, $\sqrt[2]{5}$, $\sqrt[2]{6}$, &c. express numbers incommensurable with unity. However, though these numbers are incommensurable themselves with unity, yet they are commensurable in power with it; because their powers are integers, that is, multiples of unity. They may also be commensurable sometimes with one another, as the $\sqrt[2]{8}$ and $\sqrt[2]{2}$; because they are to one another as 2 to 1: and when they have a common measure, as $\sqrt[2]{2}$ is the common measure of both; then their ratio is reduced to an expression in the least terms, as that of commensurable quantities, by dividing them by their greatest common measure. This common measure is found as in commensurable quantities, only the root of the common measure is to be made their common divisor: thus $\frac{\sqrt{12}}{\sqrt{3}}=\sqrt{4}=2$, and $\frac{\sqrt{18a}}{\sqrt{2}}=3\sqrt{a}$.

For the reduction, addition, multiplication, &c. of surds, see the article ALGEBRA.

Continued Surds are such as have their second and every succeeding term under a fresh radical sign, of the same kind as that which stands before the first term: thus,

$$\sqrt{a+\sqrt{a+\sqrt{a+\sqrt{a+\&c.\ ad.\ inf.}}}},$$

$$\sqrt[3]{q-\sqrt[3]{b-\sqrt[3]{a-\sqrt[3]{b-\sqrt[3]{a-\&c.\ ad\ inf.}}}}},$$

$$\sqrt[n]{a\sqrt[n]{x\sqrt[n]{\sqrt[n]{x\sqrt[n]{a,\ \&c.\ ad.\ inf.}}}}}$$ are continued surds.

These have been sometimes called infinite surds; and, because their expressions may be infinitely continued, some authors (among whom is Mr. Emerson; see Miscellanies, p. 433) have too hastily concluded that they are of infinite value. But that the expressions are not even diverging, might easily be demonstrated generally: and that they are in many cases of finite value, may be shown by exhibiting the method of generating such expressions.

1. Let $x^2-x=a$, then x will be equal to $\sqrt{a+x}$, and by substituting this value of x continually in the room of it, we have $x=\sqrt{a+x}=$ $\sqrt{a+\sqrt{a+x}}=\sqrt{a+\sqrt{a+\sqrt{a+x}}}=$ $\sqrt{a+\sqrt{a+\sqrt{a+\sqrt{a+x}}}}=$

$$\sqrt{a+\sqrt{a+\sqrt{a+\sqrt{a+\sqrt{a\ ad.\ inf.}}}}}$$

2. If $x=\sqrt[3]{a^2b}$, then x^4 will be equal to a^2bx, and $x=\sqrt{a\sqrt{bx}}$: substitute for x continually this value of it, then $x=\sqrt{a\sqrt{bx}}=$

$$\sqrt{a\sqrt{b\sqrt{a\sqrt{bx}}}}=$$

$$\sqrt{a\sqrt{b\sqrt{a\sqrt{b\sqrt{a\sqrt{b\ ad.\ inf.}}}}}}$$ The value of this expression was investigated by J. Bernouilli very accurately, although Emerson affirms very positively that his solution was "certainly wrong:" a very little consideration would have convinced him of his error; for, since the same surd may be otherwise expressed thus,

$$a^{\frac{1}{2}}b^{\frac{1}{4}}a^{\frac{1}{8}}b^{\frac{1}{16}}a^{\frac{1}{32}}b^{\frac{1}{64}\ \&c.}=a^{\frac{1}{2}+\frac{1}{8}+\frac{1}{32}+\frac{1}{128}\ \&c.}\times$$

$$b^{\frac{1}{4}+\frac{1}{16}+\frac{1}{64}+\frac{1}{256}\ \&c.}$$ and because the sum of the converging series $\frac{1}{2}+\frac{1}{8}+\frac{1}{32}+\frac{1}{128}$ &c. $=\frac{2}{3}$, and that of the series $\frac{1}{4}+\frac{1}{16}+\frac{1}{64}+\frac{1}{256}$ &c. $=\frac{1}{3}$, we have $a^{\frac{2}{3}}\times b^{\frac{1}{3}}=\sqrt[3]{a^2b}$ for the value of the surd, being exactly the same as the generant of the expression.

3. In nearly the same manner it might be shewn, that when $x^n-x=a$, then $x=$

$$\sqrt[n]{a+\sqrt[n]{a+\sqrt[n]{a+\sqrt[n]{a}}}};$$ and when

$x^{n-1}=a$, then $x=\sqrt[n]{a\sqrt[n]{a\sqrt[n]{a\sqrt[n]{a\ \&c.}}}}$

4. If $x^3-2ax=b$, we have $x^4-2ax^2=bx$; therefore $x=\sqrt{a+\sqrt{bx+a^2}}=$

$$\sqrt{a+\sqrt{a^2+b\sqrt{a+\sqrt{bx+a^2}}}}=$$

$$\sqrt{a+\sqrt{a^2+b\sqrt{a+\sqrt{a^2+b\sqrt{a+\sqrt{bx+a^2}}}}}}=$$

$$\sqrt{a+\sqrt{a^2+b\sqrt{a+\sqrt{a^2+b\sqrt{a+\sqrt{a^2\ ad.\ inf.}}}}}}$$

5. When $x^3+ax=b$, we have $x=\frac{1}{a}b+\frac{1}{a}x^3$

$$=\frac{1}{a}b-\frac{1}{a}\cdot\overline{\frac{1}{a}b-\frac{1}{a}x^3}^{\,3}=\frac{1}{a}b-\frac{1}{a}\cdot$$

$$\overline{\frac{1}{a}b-\frac{1}{a}\cdot\overline{\frac{1}{a}b-\frac{1}{a}x^3}^{\,3}}^{\,3}=\frac{1}{a}b-\frac{1}{a}\cdot$$

$$\overline{\frac{1}{a}b-\frac{1}{a}\cdot\overline{\frac{1}{a}b-\frac{1}{a}\cdot\overline{\frac{1}{a}\cdot b\ ad\ infin.}^{\,3}}^{\,3}}^{\,3}$$

and, putting $\frac{b}{a} = c$, the series stands thus,

$$c - \frac{1}{a} \cdot \overline{c - \frac{1}{a} \cdot \overline{c - \frac{1}{a} \cdot \overline{c \text{ ad infin.}}^{3}}^{3}}^{3}$$

That these series may often be useful in the solution of cubic equations, will be manifest from an example: thus, let $x^3 - 10x = -3$, to find x. Comparing this with the last theorem, we have $a = -10$, $b = -3$, $c = \frac{-3}{-10} = {\cdot}3$, $c^3 = {\cdot}027$: therefore $c - \frac{1}{a} \cdot c^3 = {\cdot}3027 = x$ nearly; or $c - \frac{1}{a} \cdot \overline{c - \frac{1}{a} c^3}^{3} = {\cdot}302773 = x$ more nearly, differing from the true value of x not more than 2 in the last place; and by proceeding another step, the value of x would have been determined to a very great degree of accuracy.

Sometimes these continued surds are found in the form of continued fractions, as in the following instances:

$$\sqrt[m]{a+\cfrac{b}{\sqrt[m]{a+\cfrac{b}{\sqrt{a+\cfrac{b}{\sqrt{a+\&c.}}}}}}} \qquad \sqrt[m]{a+\cfrac{b}{\sqrt[n]{c+\cfrac{d}{\sqrt[m]{a+\cfrac{b}{\sqrt[n]{c+\cfrac{d}{\sqrt[m]{a+\&c.}}}}}}}}}$$

$$\sqrt[n]{\cfrac{a}{b+\sqrt[n]{\cfrac{a}{b+\sqrt[n]{\cfrac{a}{b+\sqrt[n]{\cfrac{a}{b+\&c.}}}}}}}}$$

In the first of these the continued surd is equal in value to the root of the equation $x^{m+1} - ax = b$: the second is equal to the root of the equation $\overline{x^m - a}^{\,n} \times cx + d \times \overline{x^m - a}^{\,n} = b^n x$: and the third equal to the root of the equation $x^{n+1} + bx^n = a$.

Suppose, for example, the value was required of the continued surd

$$\sqrt[4]{8+\cfrac{64}{\sqrt{4+\cfrac{120}{\sqrt[4]{8+\cfrac{64}{\sqrt{4+\cfrac{120}{\sqrt[4]{\&c.}}}}}}}}}$$

By substituting the proper values of m, n, a, b, c, and d, in the second equation above, we have $\overline{x^4 - 8}^{\,2} \times 4x + \overline{x^4 - 8}^{\,2} \times 120 = 64^2 \times x$; whence x is found $=2$, the value of the continued surd.

For more on the nature, management, and use of continued surds, see the Additions to Euler's Algebra, and the Treatise on Algebra by Lacroix.

SU'RDITY. *s.* (from *surd.*) Deafness.

SURE. *a.* (*seure*, French.) 1. Certain; unfailing; infallible (*Psalms*). 2. Certainly doomed (*Locke*). 3. Confident; undoubting; certainly knowing (*Denham*). 4. Safe; firm; certain; past doubt or danger (*Temple*). 5. Firm; stable; not liable to failure (*Roscom.*). 6. *To be* SURE. Certainly (*Atterbury*).

SURE. *ad.* (*surement*, French.) Certainly; without doubt; doubtless (*Shakspeare*).

SURE, a river of Ireland, in Tipperary, which flows by Clonmel and Carrich to Waterford, and falls into St. George's Channel.

SUREFOO'TED. *a.* (*sure* and *foot.*) Treading firmly; not stumbling (*Herbert*).

SU'RELY. *ad.* (from *sure.*) 1. Certainly; undoubtedly; without doubt (*South*). 2. Firmly; without hazard.

SURENA, a powerful officer in the armies of Orodes, king of Parthia. His family had the privilege of crowning the kings of Persia. He was appointed to conduct the war against the Romans, and to protect the kingdom of Parthia against Crassus, who wished to conquer it. He defeated the Roman triumvir, and after he had drawn him perfidiously to a conference, he ordered his head to be cut off. He afterwards returned to Parthia, mimicking the triumphs of the Romans. Orodes ordered him to be put to death, B. C. 52.

SU'RENESS. *s.* (from *sure.*) Certainty (*Woodward*).

SU'RETISHIP. *s.* (from *surety.*) The office of a surety or bondsman; the act of being bound for another (*South*).

SU'RETY. *s.* (*sureté*, French.) 1. Certainty; indubitableness (*Genesis*). 2. Security; safety (*Sidney*). 3. Foundation of stability; support (*Milton*). 4. Evidence; ratification, confirmation (*Shaks.*). 5. Security against loss or damage; security for payment (*Shaks.*). 6. Hostage; bondsman; one that gives security for another (*Hammond*).

SURF, is a term used by seamen to express a peculiar swell and breaking of the sea upon the shore. It sometimes forms but a single range along the shore, and at others three or four behind one another, extending perhaps half a mile out to sea. The surf begins to assume its form at some distance from the place where it breaks, gradually accumulating as it moves forward, till it gain, not uncommonly, in places within the limits of the trade-winds, a height of fifteen or twenty feet, when it overhangs at top, and falls like a cascade with great force and a prodigious noise. Countries where surfs prevail require boats of a particular construction, very different from the greater part of those which are built in Europe. In some places surfs are great at high, and in others at low water; but we believe they are uniformly most violent during the spring-tides.

SU'RFACE. *s.* (*sur* and *face*, Fr.) Superficies; outside (*Newton*).

To SU'RFEIT. *v. a.* (from *sur* and *faire*, French.) To feed with meat or drink to satiety or sickness; to cram overmuch (*Shaks.*).

To SU'RFEIT. *v. n.* To be fed to satiety and sickness (*Clarendon*).

SU'RFEIT. *s.* (from the verb.) Sickness or satiety caused by overfulness (*Otway*).

SU'RFEITER. *s.* (from *surfeit.*) One who riots; a glutton (*Shakspeare*).

SU'RFEITWATER. *s.* (*surfeit* and *water.*) Water that cures surfeits (*Locke*).

SURGE. *s.* A swelling sea; wave rolling above the general surface of the water (*Sandys*).

To SURGE. *v. n.* (from *surgo*, Latin.) To swell; to rise high (*Milton*).

SU'RGEON. *s.* (corrupted from *chirurgeon.*) One who cures by manual operation (*Taylor*).

SU'RGEONRY. SU'RGERY. *s.* (for *chirurgery*). The act of curing by manual operation (*Shakspeare*).

SURGERY. (from χειρ, the hand, and εργον, work. Chirurgery. That part of medicine which attempts the cure or alleviation of diseases by external treatment.

This art or science involves a knowledge of two distinct kinds, each of which is of essential and equal consequence; the one anatomical, and the other operative. Without a knowledge of anatomy, a thousand blunders must be perpetually committed by the most steady and delicate operator; and without a minute study of the means by which the external treatment is to be effected, without a minute acquaintance with the mechanism or other properties of the instruments that are to be handled, and which can never be acquired without actual practice, the best theoretical anatomist must be but a bad workman, and too frequently find himself at a loss. Upon the department of ANATOMY we have already treated, and shall refer the reader to the article upon this subject; upon the operative department it will be most advantageous to treat as the different cases arise, which it is the immediate object of the present article to develop. We shall, therefore, at present, only notice, that this sort of preparatory knowledge should be chiefly directed to the different kinds and applications of bandages; of instruments; of sutures and ligatures; the most delicate mode of dressing wounds, tumours, or other external ailments; dexterity in the use of instruments; in the reduction of luxations or fractures; the taking up of vessels; and the means of diminishing pain during the performance of an operation.

Having premised these observations, we shall now proceed in regular order, and shall commence with a brief sketch of the art as it appears to have been practised in former times.

HISTORY OF SURGERY.

That the practice of what we may be allowed to call manual medicine was coeval with its other branches, if not antecedent to them, will not admit of a doubt. The wars and contentions which have taken place among mankind almost ever since their creation, necessarily imply that there would be occasion for surgeons at a very early period; and probably these external injuries would for some time be the only diseases for which a cure would be attempted, or perhaps thought practicable. In the sacred writings we find much mention of balsams, particularly the balm of Gilead, as excellent in the cure of wounds; though at the same time we are informed that there were some wounds which this balsam could not heal.

Concerning the surgery practised among the Egyptians, Jews, and Asiatic nations, we know little or nothing. The Greeks were those from whom the art descended to us, though they confessedly received it from the eastern nations. The first Greek surgeons on record are Æsculapius and his sons Podalirius and Machaon. Æsculapius flourished about fifty years before the Trojan war; and his two sons distinguished themselves in that war both by their valour and skill in curing wounds. This indeed is the whole of the medical skill attributed to them by Homer; for in the plague which broke out in the Grecian camp, he does not mention their being at all consulted. Nay, what is still more strange, though he sometimes mentions his heroes having their bones broke, he never takes notice of their being reduced or cured by any other than supernatural means; as in the case of Æneas, whose thigh bone was broken by a stone cast at him by Diomed. The methods which these two famous surgeons used in curing the wounds of their fellow-soldiers seems to have been the extracting or cutting out the darts which inflicted them, and applying emollient fomentations or styptics to them when necessary: and to these they undoubtedly attributed much more virtue than they could possibly possess; as appears from the lines where Homer describes Eurypylus as wounded, and under the hands of Patroclus, who would certainly practise according to the directions of the surgeons.

Till the days of Hippocrates we know very little of what was the practice of the Greek surgeons. From him, however, we learn, that the practice of blood-letting, cupping, and scarification, was known to them; also the use of warm and emollient fomentations, issues made with hot irons, pessaries, injections, fumigations, &c. Hippocrates also gives directions with regard to fractures, luxations, ulcers, fistulas. He directs the extension, reduction, bandages, and splints, proper to be used in fractures and luxations of different bones, with several machines to increase the extension when necessary. He directs the laxity and tightness of the bandages; the intervals for unloosing and binding them on again; the position and repose of the fractured member, and the proper regimen; and he mentions the time when a callus is usually formed. He treats also of fractures of the skull, and the method of applying the trepan. In his treatment of ulcers, he speaks of reducing fungous flesh by means of escharotics, some of which are alum, nitre, verdigris, quicklime, &c.

In the time of Ptolemy Philopater of Egypt, medicine, all the branches of which had hitherto been practised by the same person, was divided into three, viz. the dietetic, pharmaceutic, and surgical; from which time to the present, surgery has continued to be reckoned a distinct profession from medicine, though very improperly, in the opinion of the best authors.

Surgery appears not to have existed in Rome, notwithstanding the warlike genius of the people, for more than 500 years. Archagathus, a Greek, was the first professor of that art in the city; and so frequently employed the knife, hot irons, and other cruel methods of cure, that he was branded with the opprobrious title of *carnifex*, and expelled the city, where no physician or surgeon of eminence again made his appearance for 180 years. At this time Asclepiades undertook the profession of medicine; but seems to have dealt little in surgery. Neither have we any thing of importance on that subject till the time of Celsus, who flourished during the reigns of Augustus and Tiberius. In his surgery, all the improvements from Hippocrates to his own days are collected; the most minute and trifling diseases are not omitted. An eminent surgeon of the moderns emphatically exhorts every person in that profession "to keep Celsus in his hands by day and by night." He describes the signs of a fractured skull, the method of examining for the fracture, of laying the skull bare by an incision in the form of the letter X, and afterwards of cutting away the angles, and of applying the trepan, with the signs of danger and of recovery. He observed that sometimes, though very rarely, a fatal concussion of the brain might happen, the blood-vessels within the skull being burst, yet the bone remaining entire. After the operation of the trepan, sponges and cloths wetted with vinegar, and several other applications, were made to the head; and, throughout, severe abstinence was enjoined. In violent fractures of the ribs, he ordered venesection; low diet; to guard against all agitation of the mind, loud speaking, motion, and every thing that might excite coughing or sneezing. Cloths wetted with wine, roses and oil, and other applications, were laid over the fracture. The cure of fractures, in the upper and lower extremities, he said, were nearly alike; that fractures differ in degree of violence and danger, in being simple or compound, that is, with or without a wound of the flesh, and in being near to the joint. He directs the extension of the member by assistants; the reduction, by the surgeon's hands, of the fractured bones into their natural situation; and to bind the fractured part with bandages of different lengths, previously dipped in wine and oil: on the third day fresh bandages are to be applied, and the fractured member fomented with warm vapour, especially during the inflammation. Splints, if necessary, are to be applied, to retain the bones in a fixed position. The fractured arm is to be suspended in a broad sling hung round the neck: the fractured leg is to be inclosed in a kind of case, reaching above the ham, and accommodated likewise with a support to the foot, and with straps at the side, to keep the leg steady: in the fractured thigh-bone, the case is to extend from the top of the hip to the foot. He describes the method of treating compound fractures, and of removing small fragments of splinters of bones; and the manner of extracting darts. In luxations of the shoulder, he mentions several methods of giving force to the extension, and of replacing the dislocated bone. One method similar to that of Hippocrates was, to suspend the patient by the arm; the fore-part of the shoulder, at the same time, resting upon the top of a door, or any other such firm fulcrum. Another method was to lay the patient supine, some assistants retaining the body in a fixed position, and others extending the arm in the contrary direction; the surgeon, in the mean time, attempting, by his hands, forcibly to reduce the bone into its former place.

If a large inflammation were expected to ensue after a wound, it was suffered to bleed for some time, and blood was drawn from the arm. To wounds accompanied with considerable hæmorrhagy, he applied a sponge wet in vinegar, and constant pressure: if necessary, on account of the violence of the hæmorrhagy, ligatures were made round the vessels, and sometimes the bleeding orifice was seared up with the point of a hot iron. On the third day fresh dressings were applied. In considerable contusions, with a small wound of the flesh, if neither blood-vessels nor nerves prevented, the wound was to be enlarged. Abstinence and low diet, upon all such accidents, were prescribed; cloths wet with vinegar, and several other applications, were to be applied to the inflamed part. He observes, that fresh wounds may be healed without compound applications. In external gangrene, he cut into the sound flesh; and when the disease, in spite of every effort, spread, he advised amputation of the member. After cutting to the bone, the flesh was then separated from it, and drawn back, in order to save as much flesh as possible to cover the extremity of the bone. Celsus, though extremely diffuse in the description of surgical diseases, and of various remedies and external applications, treats slightly of the method of amputating; from which, comparing his treatise with the modern systems, we might infer that the operation was then seldomer practised than at present. He describes the symptoms of that dangerous inflammation the carbuncle, and directs immediately to burn, or to corrode the gangrened part. To promote the suppuration of abscesses, he orders poultices of barley-meal, or of marsh-mallows, or the seeds of linseed and fenugreek. He also mentions the compositions of several repellent cataplasms. In the erysipelas, he applies ceruse, mixed with the juice of nightshade; and sal-ammoniac was sometimes mixed with his plasters.

He is very minute in describing diseases of the eyes, ears, and teeth, and in prescribing a multitude of remedies and applications. In inflammation of the eyes, he enjoined abstinence and low diet, rest, and a dark room: if the inflammation was violent, with great pain, he ordered venesection, and a purgative; a small poultice of fine flour, saffron, and the white of an egg, to be laid to the forehead to suppress the flow of pituita; the soft inside of warm wheat-bread dipped in wine, to be laid to the eye; poppy and roses were also added to his collyriums, and various ingredients too tedious to enumerate. In chronic watery defluxions of the eyes, he applied astringents, cupped the temples, and burnt the veins over the temple and forehead. He couched cataracts by depressing the crystalline lens to the bottom of the orbit. Teeth loosened by any accident, he directs, after the example of Hippocrates, to be fastened with a gold thread to those adjoining on each side. Previous to drawing a tooth, he ordered the gum to be cut round its neck; and if the tooth was hollow, it was to be filled with lead before extraction, to prevents its breaking by the forceps. He describes not only the inflammation, but likewise the elongation, of the uvula; he also describes the polypus, and some other diseases affecting the nose.

He describes several species of hernia or rupture, and the manual assistance required in those complaints. After the return of the intestines into the abdomen, a firm compress was applied to that part of the groin through which they protruded, and was secured by a bandage round the loins. In some cases, after the return of intestinal ruptures, he diminished the quantity of loose skin, and formed a cicatrix, so as to contract over the part, to render it more rigid and capable of resisting. He describes various diseases of the genital parts, the hydrocele or dropsy of the scrotum, a difficulty of urine, and the manner of drawing off the water by a catheter; the signs of stone in the bladder, and the method of sounding or feeling for that stone. Lithotomy was at that time performed by introducing two fingers into the anus; the stone was then pressed forward to the perinæum, and a cut made into the bladder; and by the finger or by a scoop the stone was extracted. He describes the manner of performing this operation on both the sexes, of treating the patient, and the signs of recovery and of danger.

Celsus directed various corrosive applications and injections to fistulas; and, in the last extremity, opened them to the bottom with a knife, cutting upon a grooved instrument or conductor. In old callous ulcers, he made a new wound, by either cutting away the hard edges, or corroding them with verdigris, quicklime, alum, nitre, and with some vegetable escharotics. He mentions the symptoms of caries in the bone; directs the bone to be laid bare, and to be pierced with several holes, or to be burnt or rasped, in order to promote an exfoliation of the corrupted part; afterwards to apply nitre and several other ingredients. One of his applications to a cancer was auripigmentum or arsenic. He directs the manner of tapping the abdomen in ascites, and of drawing blood by the lancet and cupping-glasses. His cupping-glasses seem not to have been so convenient as the modern: they were made either of brass or horn, and were unprovided with a pump. He cured varicose veins by ustion or by incision. He gives directions for extracting the dead fœtus from the womb, in whatever position it should present; and, after delivery, to apply to the private parts soft cloths wet in an infusion of vinegar and roses. In Celsus's works there is a great redundance and superfluity of plasters, ointments, escharotics, collyriums, of suppurating and discutient cataplasms, and external applications of every kind, both simple and compound: perhaps, amongst the multitude, there are a few useful remedies now laid aside and neglected.

The last writer of consequence who flourished at Rome was Galen, physician to the emperor Marcus Aurelius. His works are for the most part purely medicinal; although he wrote also on surgery, and made commentaries on the surgery of Hippocrates. He opened the jugular veins, and performed arteriotomy at the temples; directed leeches, scarification, and cupping-glasses, to draw blood. He also described with accuracy the different species of herniæ or ruptures.

In the year 500 flourished Aëtius, in whose works we meet with many observations omitted by Celsus and Galen, particularly on the surgical operations, the diseases of women, the causes of difficult labours, and modes of delivery. He also takes notice of the dracunculus, or Guinea worm. Aëtius, however, is greatly excelled by Paulus Ægineta, who flourished in 640; whose treatise on surgery is superior to that of all the other ancients. He directs how to extract darts; to perform the operation sometimes required in dangerous cases of rupture or hernia. He treats also of aneurism. Galen, Paulus, and all the ancients, speak only of one species of aneurism, and define it to be "a tumour arising from arterial blood extravasated from a ruptured artery." The aneurism from a dilatation of the artery is a discovery of the moderns. In violent inflammations of the throat, where immediate danger of suffocation was threatened, Paulus performed the operation of bronchotomy. In obstinate defluxions upon the eyes, he opened the jugular veins. He describes the manner of opening the arteries behind the ears in chronic pains of the head. He wrote also upon midwifery. Fabricius ab Aquapendente, a celebrated surgeon of the sixteenth century, has followed Celsus and Paulus as text-books.

From the time of Paulus Ægineta to the year 900, no writer of any consequence, either on medicine or surgery, appeared. At this time the Arabian physicians, Rhazes and Avicenna, revived in the east the medical art, which, as well as others, was almost entirely extinguished in the west. Avicenna's Canon Medicinæ, or General System of Medicine and Surgery, was for many ages celebrated through all the schools of physic. It was principally compiled from the writings of Galen and Rhazes. The latter had correctly described the spina ventosa, accompanied with an enlargement of the bone, caries, and acute pain. In difficult labours, he recommends the fillet to assist in the extraction of the fœtus; and for the same purpose, Avicenna recommends the forceps. He describes the composition of several cosmetics to polish the skin, and make the hair grow, or fall off.

Notwithstanding this, however, it was not till the time of Albucasis that surgery came into repute among the Arabians. Rhazes complains of their gross ignorance, and that the manual operations were performed by the physicians' servants. Albucasis enumerates a tremendous list of operations, sufficient to fill us with horror. The hot iron and cauteries were favourite remedies of the Arabians; and, in inveterate pains, they reposed, like the Egyptians and eastern Asiatics, great confidence in burning the part. He describes accurately the manner of tapping in ascites; mentions several kinds of instruments for drawing blood; and has left a more ample and correct delineation of surgical instruments than any of the ancients. He gives various obstetrical directions for extracting the fœtus in cases of difficult labour. He mentions the bronchocele, or prominent tumor on the neck, which, he tells us, was most frequent among the female sex. We are also informed by this writer, that the delicacy of the Arabian women did not permit male surgeons to perform lithotomy on females; but when necessary, it was executed by one of their own sex.

From the eleventh century to the middle of the fourteenth, the history of surgery affords nothing remarkable except the importation of that nauseous disease the leprosy into Europe. Towards the end of the fifteenth century the venereal disease is said, though apparently without foundation, to have been imported from America by the first discoverers of that continent.

At the beginning of the sixteenth century, surgery was held in contempt in this island, and was practised indiscriminately by barbers, farriers, and sow-gelders. Barbers and surgeons continued, for 200 years after, to be incorporated in one company both in London and Paris. In Holland and some parts of Germany, even at this day, barbers exercise the razor and lancet alternately.

It is only within the last three centuries that we have made any considerable improvement in surgery; nor do we know of any eminent British surgical writers until within the last 130 years. "In Germany (says Heister) all the different surgical operations, at the beginning even of the eighteenth century, were left to empirics; while regular practitioners were contented to cure a wound, open a vein or an abscess, return a fractured or luxated bone; but they seldom or never ventured to perform any of the difficult operations." He also speaks of their gross ignorance of the Latin language.

The first surgical work of the sixteenth century worthy of notice is that of J. Carpus. F. ab Aquapendente, an Italian, published about the same period a System of Surgery; containing a description of the various diseases, accidents, and operations. Boerhaave pays this author the following compliment: Ille superavit omnes, et nemo illi hanc disputat gloriam; omnibus potius quam hocce carere possumus. Not long afterwards, A. Parey, a Frenchman, made several important additions to surgery, particularly in his collection of cases of wounds, fractures, and other accidents which occur during war. The ancients, who were ignorant of powder and fire-arms, are defective in this part of military surgery. Parey pretends to have first invented the method of tying, with a needle and strong silk-thread waxed, the extremities of large arteries, after the amputation of a member. The ligature of the blood vessels is, however, merely a revival of the ancient practice, which had fallen into disuse: throughout the dark ages, the hot iron, cauteries, and strong astringents, were substituted in its place. B. Maggius and L. Botallus wrote on the cure of gun-shot wounds. J. A. Cruce wrote a system of surgery.

In the seventeenth century, surgery was enriched with several systems, and with a greater variety of detached or miscellaneous observations. The principal authors are, M. A. Severinus, V. Vidius, R. Wiseman, Le Clerc, J. Scultetus, J. Mangetus, C. Magatus, Spigellius, F. Hildanus, T. Bartholin, P. de Marchett.

It is chiefly, however, since the commencement of the last century that this art has flourished in any very considerable degree; and so numerous are the excellent writers upon it, that we have not space to transcribe even a list of their names. Yet we ought not to close this part without strongly recommending to the young student to peruse, as systematic works, those of Latta, Richter, and Callisen; and as highly valuable works upon detached or miscellaneous subjects, the publications of Le Dran, Sabatier, Desault, Bertrandi, Scarpa, John Hunter, Sharp, Home, Abernethy, Hey, and Astley Cooper.

We now enter upon the practical branch of the present article, which we shall endeavour to arrange in as systematic a method as it will perhaps bear, and shall for this purpose deviate from the looser manner in which it has hitherto been generally treated of. We shall not venture, however, upon the common terms employed in a classific arrangement, but shall modestly content ourselves with those of part, division, chapter, and section, instead of class, order, genus, and species.

The different subjects that comprise the art of surgery may, as it appears to us, be conveniently distributed, in the first place, into two parts, lesions, or accidental affections, and diseases, or constitutional affections. Our secondary partitions, which we shall call divisions, may be taken for both the preceding parts, from the nature of the organs affected, as soft or hard. Our third set of partitions will be characterised by the nature of the complaint, or of the necessary mode of attending to it, which we shall denominate chapters; and our fourth, or subordinate set of partitions, sections.

PART I.

LESIONS, OR ACCIDENTAL AFFECTIONS.

DIVISION I.

SOFT PARTS.

CHAPTER I. *Wounds.*
———— II. *Burns.*
———— III. *Ulcers.*
———— IV. *Contusions and Sprains.*
———— V. *Compressions and Concussions.*

It will be sufficient to notice the sections in their proper place as we proceed.

CHAPTER I. *Wounds.*

SECTION I. *Simple Wounds.*

The first thing to be considered in the inspection of a wound is, whether it be likely to prove mortal or not. This knowledge can only be had from anatomy, by which the surgeon will be able to determine what parts are injured; and, from the offices which these parts are calculated to perform, whether the human frame can subsist under such injuries. It is not, however, easy for the most expert anatomist always to prognosticate the event with certainty; but this rule he ought always to lay down to himself, to draw the most favourable prognosis the case will bear, or even more than the rules of his art will allow. This is particularly incumbent on him in sea engagements, where the sentence of death is often executed as soon as pronounced, and the miserable patient is thrown alive into the sea, upon the surgeon's declaring his wound to be mortal. There are, besides, many instances on record, where wounds have healed, which the most skilful surgeons have deemed mortal. The following wounds may be reckoned mortal.

1. Those which penetrate the cavities of the heart, and all those wounds of the viscera where the large blood-vessels are opened; because their situation will not admit of proper applications to restrain the flux of blood.

2. Those which obstruct or entirely cut off the passage of the nervous influence through the body. Such are wounds of the brain, cerebellum, medulla oblongata, and spinal marrow; though the brain is sometimes injured, and yet the patient recovers. Wounds likewise of the small blood-vessels within the brain are attended with great danger, from the effused fluids pressing upon the brain. Nor is there less danger where the nerves which tend to the heart are wounded, or entirely divided; for, after this, it is impossible for the heart to continue its motion.

3. All wounds which entirely deprive the animal of the faculty of breathing.

4. Those wounds which interrupt the course of the chyle to the heart; such are wounds of the

receptacle of the chyle, thoracic duct, and larger lacteals, &c.

5. There are other wounds which prove fatal if neglected and left to nature: such are wounds of the larger external blood-vessels, which might be remedied by ligature.

In examining wounds, the next consideration is, whether the parts injured are such as may be supposed to induce dangerous symptoms, either immediately or in some time during the course of the cure. In order to proceed with any degree of certainty, it is necessary to be well acquainted with those symptoms which attend injuries of the different parts of the body. If the skin only and part of the cellular substance is divided, the first consequence is an effusion of blood; the lips of the wound retract, become tumefied, red and inflamed, leaving a gap of considerable wideness according to the length and deepness of the wound. Besides, if a very considerable portion of skin and cellular substance is divided, a slight fever seizes the patient; the effusion of blood in the mean time stops, and the wound is partly filled up with a cake of coagulated blood. Below this cake, the small vessels pour forth a clear liquor, which in a short time is converted into pus. Below this pus granulations of new flesh arise, the cake of coagulated blood loosens, a new skin covers the place where the wound was, and the whole is healed up; only there remains a mark, called a cicatrix or scar, showing where the injury had been received.

All wounds are accompanied with a considerable degree of pain, especially when the inflammation comes on, though the division reaches no farther than the skin and cellular substance. If the muscular fibres are divided, the pain is much greater, because the sound part of the muscle is stretched by the contraction of the divided part and the action of the antagonist muscle, which it is now less fitted to bear. The wound also gaps much more than where the cellular substance only is divided, insomuch that, if left to itself, the skin will cover the muscular fibres, without any intervention of cellular substance; and not only a very unsightly cicatrix remains, but the use of the muscle is in some measure lost. If the muscle happens to be totally divided, its parts retract to a very considerable distance; and unless proper methods be taken, the use of it is certainly lost ever afterwards.

In the cure of wounds the ancients imagined balsams, the juice of herbs, &c. to be a kind of specifics. In after-ages, and in countries where balsams are not easily to be procured, salves have been substituted in their place; and even at this day there are many who reckon a salve or ointment essentially necessary for healing the slightest cut. It is certain, however, that the cure of wounds cannot be effected, nay, not even forwarded in the least, by ointments, unless in particular cases or by accident. That power which the human frame has of repairing the injuries done to itself, which by physicians is called *vis medicatrix naturæ*, is the sole agent in curing external injuries; and without this the most celebrated balsams would prove ineffectual. When a wound has been made with a sharp instrument, and is not extensive, if it be immediately cleaned, and all the extravasated blood sucked out, it will almost always heal by the first intention in a very short time. Indeed the cures performed by this simple process are so surprising, that they would be incredible were we not assured of their reality by eye-witnesses. When this process is either neglected or proves unsuccessful, there are three stages to be observed in the cure of a wound: the first, called digestion, takes place when the ends of the wounded vessels contract themselves, and pour out the liquor which is converted into pus. As soon as this appears, the second stage, in which the flesh begins to grow up, takes place; and as this proceeds, the edges of the wound acquire a fine bluish or pearl colour, which is that of the new skin beginning to cover the wound as far as the flesh has filled it up. This process continues, and the skin advances from all sides towards the centre, which is called the cicatrizing of the wound. For the promoting of each of these processes, several ointments were formerly much in vogue. But it is now found, that no ointment whatever is capable of promoting them; and that it is only necessary to keep the wound clean, and to prevent the air from having access to it. This, indeed, nature takes care to do, by covering the wound with a cake of coagulated blood; but if a wound of any considerable magnitude should be left entirely to nature, the pus would form below the crust of coagulated blood in such quantity, that it would most probably corrupt, and the wound degenerate into a corroding ulcer. It is necessary, therefore, to cleanse the wound frequently; and for this purpose it will be proper to apply a little ointment spread on soft scraped lint. For the first dressing, dry lint is usually applied, and ought to be allowed to remain for two or three days, till the pus is perfectly formed; after which the ointment may be applied as just now directed; and, in a healthy body, the wound will heal without further trouble. As to the ointment employed, it is almost indifferent what it be, provided it has no acrid or stimulating ingredient in its composition.

But though, in general, wounds thus easily admit of a cure, there are several circumstances which require a different treatment, even in simple divisions of the fleshy parts, when neither the membranous nor tendinous parts are injured. These are, 1. Where the wound is large, and gapes very much, so that, if allowed to heal in the natural way, the patient might be greatly disfigured by the scar. It is proper to bring the lips of the wound near to each other, and to join them either by adhesive plaster or by suture, as the wound is more superficial, or lies deeper. 2. When foreign bodies are lodged in the wound, as when a cut is given by glass, &c. it is necessary by all means to extract them, before the wound is dressed; for it will never heal until they are discharged. When these bodies are situated in such a manner as not to be capable of being extracted without lacerating the adjacent parts, which would occasion violent pain and other bad symptoms, it is necessary to enlarge the wound, so that these offending bodies may be easily removed. This treatment, however, is chiefly necessary in gunshot wounds, of which we shall treat in the next section. 3. When the wound is made in such a manner that it runs for some length below the skin, and the bottom is much lower than the orifice, the matter collected from all parts of the wound will be lodged in the bottom of it, where, corrupting by the heat, it will degenerate into a fistulous ulcer. To prevent this, we must use compresses, applied so that the bottom of the wound may suffer a more considerable pressure than the upper part of it. Thus the matter formed at the bottom will be gradually forced upwards, and that formed at the upper part will be incapable of descending by its weight; the divided parts, in the mean time, easily uniting when brought close together. Indeed, the power which nature has of uniting different parts of the human body is very surprising; for, according to authors of credit, even if a piece of flesh be totally cut out, and applied in a short time afterwards to the place from whence it was cut, the two will unite. That a part cut out of a living body does not entirely lose its vital power for some time, is evident from the modern practice of transplanting teeth; and from an experiment of Mr. Hunter's at London, he put the testicle of a cock into the belly of a living hen, which adhered to the liver, and became connected to it by means of blood-vessels. We have therefore the greatest reason to hope, that the divided parts of the human body, when closely applied to each other, will cohere without leaving any sinus or cavity between them. However, if this method should fail, and matter still be collected in the depending part of the wound, it will be necessary to make an opening in that part in order to let it out; after which the wound may be cured in the common way. 4. During the course of the cure, it sometimes happens that the wound, instead of filling up with fleshy granulations of a florid colour, shoots up into a glassy like substance which rises above the level of the surrounding skin, while, at the same time, instead of laudable pus, a thin ill-coloured and fetid ichor is discharged. In this case the lips of the wound lose their beautiful pearl colour, and become callous and white, nor does the cicatrizing of the wound at all advance. When this happens in a healthy patient, it generally proceeds from some improper management, especially the making use of too many emollient and relaxing medicines, an immoderate use of balsams and ointments. Frequently nothing more is requisite for taking down this fungus than dressing with dry lint; at other times desiccative powders, such as calamine, tutty, calcined alum, &c. will be necessary; and sometimes red precipitate mercury must be used. This last, however, is apt to give great pain, if sprinkled in its dry state upon the wound; it is therefore most proper to grind it with some yellow basilicon ointment, which makes a much more gentle, though at the same time an efficacious escharotic. Touching the overgrown parts with blue vitriol is also found very effectual.

Diet and Regimen.

Hitherto we have considered the wounded patient as otherwise in a state of perfect health; but it must be observed, that a large wound is capable of disordering the system to a great degree, and inducing dangerous diseases which did not before exist. If the patient be strong and vigorous, and the pain and inflammation of the wound great, a considerable degree of fever may arise, which it will be necessary to check by bleeding, low diet, and other parts of the antiphlogistic regimen, at the same time that the inflamed lips of the wound and parts adjacent are to be treated with emollient fomentations or cataplasms till the pain and swelling abate. On the other hand, it may happen, when the patient is of a weak and lax habit, that the vis vitæ may not be sufficient to excite such an inflammation in the wound as is absolutely necessary for its cure. In this case, the edges of the wound look pale and soft; the wound itself ichorous and bloody, without any signs of fleshy granulations; or if any new flesh shoots up, it is of the fungous glassy kind above mentioned. To such wounds all external applications are vain; it is necessary to strengthen the patient by proper internal remedies, among which the bark has a principal place, until the wound begins to alter its appearance. In such persons, too, there is some danger of a hectic fever by the absorption of matter into the body when the wound is large; and this will take place during the course of the cure, even when the appearances have been at first as favourable as could be wished. This happens generally when the wound is large, and a great quantity of matter formed: for by this discharge the patient is weakened; so that the pus is no sooner formed, than it is by the absorbent vessels re-conveyed into the body, and feverish heats immediately affect the patient. For this the best remedy is to exhibit the bark copiously, at the same time supporting the patient by proper cordials and nourishing diet. Indeed, in general, it will be found, that, in the case of wounds of any considerable magnitude, a more full and nourishing regimen is required than the patient, even in health, has been accustomed to; for the discharge of pus alone, where the quantity is considerable, proves very debilitating, if the patient is not strengthened by proper diet. And it is constantly found, that the cure of such sores goes on much more easily when the patient is kept in his usual habit of body, than when his system is much emaciated by a very low allowance; and, for the same reason, purgatives, and whatever else tends to weaken the constitution, are improper in the cure of wounds.

Wounds of the Nerves, Tendons, or Ligaments.

These are attended with much more violent symptoms than those where even considerable arteries are divided, and frequently resist every method of cure proposed by the most skilful practitioners. In the simple process of blood-letting, it frequently happens that the tendinous expansion called the aponeurosis of the biceps muscle is wounded, or even the tendon of that muscle itself is punctured, by the point of the lancet; or sometimes a nerve which happens to lie in the neighbourhood is partially divided. Any one of these wounds, though they are the smallest we can well suppose to be given, are frequently very dangerous and difficult of cure. It sometimes immediately happens on the introduction of the lancet, that the patient complains of a most exquisite degree of pain; and when this occurs, we may rest assured that either a nerve or tendon has been wounded. On some occasions, by proper management, such as evacuating a considerable quantity of blood at the orifice newly made, by keeping the part at perfect rest, and preserving the patient in as cool a state as possible, the pain at first complained of will gradually abate, and at last go off entirely without any bad consequence whatever. At other times, however, this pain which occurs instantaneously on the introduction of the lancet, instead of abating, begins soon to increase; a fullness, or small degree of swelling, takes place in the parts contiguous to the wound; the lips of the sore become somewhat hard and inflamed; and in the course of twenty-four hours or so from the operation, a thin watery serum begins to be discharged at the orifice.

In a wound or rupture of the tendo Achillis, the knee should be kept constantly bent to relax the muscles of the leg, and the foot should be stretched out to admit of the ends of the ruptured tendon being brought nearly into contact. A roller should be applied with a firmness quite sufficient for securing the muscles and tendons in this situation; but care must be taken to prevent it from impeding the circulation. With this view, fine soft flannel should be preferred either to linen or cotton; for being more elastic, it more readily yields to any swelling with which the limb may be attacked.

The late Dr. Munro was the first who gave any accurate directions for the treatment of rupture in the large tendons; and it is perhaps given with more precision, from his having himself experienced the effects of this misfortune in the tendo Achillis.

He used a foot-sock or slipper, made of double quilted ticking, and left open at the toe; from the heel of which a strap went up above the calf of the leg. A strong piece of the same materials went round the calf, and was fastened with a lace. On the back part of this was a buckle, through which the strap of the foot-sock was passed, by which the calf could be brought down, and the foot extended at pleasure. Besides here was a piece of tin applied to the fore part of the leg, to prevent the foot from getting into any improper posture during sleep. After proposing to walk, he put on a shoe with a heel two inches deep; and it was not till the expiration of five months that he ventured to lay aside the tin plate; and he continued the use of the high-heeled shoe for two years.

From this treatment a knowledge may be formed of the treatment necessary to be followed in the laceration of tendons of other parts of the body.

Wounds of the Thorax.

Even though in wounds of the thorax none of the viscera should be wounded, we may yet reasonably expect that a considerable quantity of blood will be extravasated; and this, if very large, must be evacuated if possible. However, it ought to be particularly observed, that this extravasated blood should not be discharged before we are assured that the wounded vessels have done bleeding. When the pulse appears sufficiently strong and equal, the extremities are warm, no hickup or convulsion appears, and the patient's strength continues, we may then know that the internal hæmorrhagy has ceased, and that the means of discharging the blood may now be safely used. Matter, water, blood, &c. have sometimes vanished from the cavities of the thorax, and been afterwards discharged by sweat, urine, &c. Yet this but seldom happens; and if we were to trust to nature only in these cases, it is certain that many would perish from a destruction of the vital viscera by the extravasated and putrid blood, who by an artificial extraction of the same blood might have been saved.

Wounds of the Abdomen.

These must be closed as soon as possible, and then treated as simple wounds; only they ought to be dressed as seldom and expeditiously as may be. A spare diet, with other parts of the antiphlogistic regimen, is here absolutely necessary. It sometimes happens, that, through a large wound of the abdominal integuments, the intestine comes out without being injured; yet, if it remains for any time exposed to the air, the case is commonly very dangerous. The most certain method, in all such cases, is to return the protruded part as soon as possible; for although writers in general formerly recommended warm fomentations, &c. to be previously applied, the latest authors upon this subject consider the most natural and proper fomentation to be that which is produced by the heat and moisture of the patient's belly, and that therefore the intestines, if no mortification has taken place, are to be cleared from extraneous matter, and immediately returned.

When the wound of the abdomen is large, the intestines easily prolapse, but are as easily returned. But when part of an intestine has been forced through a narrow wound, the disorder is much more dangerous. For the prolapsed intestine being distended by flatus, or the ingested aliments driven thither by the peristaltic motion, it will be inflamed, tumefied, and incapable of being returned through the stricture of the wound; whence a stoppage of the circulation and gangrene will soon follow. In this case the utmost care is to be taken to reduce the intestine to its natural size. When this cannot be accomplished by other means, some practitioners of great eminence have even advised the puncturing of the intestine in different places in order to discharge the flatus. This practice has also been recommended in an incarcerated hernia, but is exceedingly disapproved of by Mr. Pott and later writers; and it seems to be very dubious whether any good can possibly arise from it. To puncture any part that is already inflamed, must undoubtedly add to the inflammation; and it is very improbable that the discharge of flatus procured by the punctures would at all be a recompense for the bad consequences produced by the increased inflammation. The method of Celsus is much more eligible: it is to dilate the wound so as to reduce the intestine with ease. Sometimes part of the intestine is lost either by suppuration or gangrene. In this case, all that can be done is to strike a single stitch through the wounded bowel, and to fix it to the external wound by passing the suture also through the sides of the wound. The ends of the intestine may perhaps adhere; or at any rate the wound will continue to perform the office of an anus, out of which the fæces will continue to be discharged during life. The directions given by some surgeons about inserting the upper end of the gut into the lower, and stitching them together, are perfectly impracticable, as Mr. John Bell has shewn in his Discourses on Wounds, Part II.; and even if they were practicable, would certainly produce new mortification, which could not but be fatal.

When the omentum appears prolapsed, the same general treatment is to be observed; only that, when it is dry and mortified, the dead part may safely be extirpated.—We shall conclude the article of abdominal wounds with a case from the Memoirs of the Academy of Sciences for the year 1705, which shews that we ought not to despair, even though the most desperate symptoms should take place, as long as any vis vitæ remains. A madman wounded himself in 18 different places in the abdomen. Eight of these penetrated the cavity, and injured the contained viscera; he had a diarrhœa, nausea, and vomiting, tension of the abdomen, with difficult respiration and violent fever, so that his life was despaired of. During the first four days he was blooded seven times; and during the greatest part of the cure his diet consisted almost entirely of flesh broths, with the addition of some mild vegetables. By these means he was not only cured of his wounds, but restored to his right senses. Seventeen months after he went mad again, and threw himself over a precipice, by which he was instantly killed: on opening the body, the wounds were found to have penetrated the middle lobe of the liver, the intestinum jejunum, and the colon.

Wounds of the Head.

In wounds of the head, where the cellular membrane only is affected, and the aponeurosis and pericraneum untouched, phlebotomy, lenient purges, and the use of the common febrifuge medicines, particularly those of the neutral kind, generally remove all the threatening symptoms. When the inflammation is gone off, it leaves on the skin a yellowish tint and a dry scurf, which continue until perspiration takes them away; and upon the removal of the disease, the wound immediately recovers a healthy aspect, and soon heals without further trouble. But in the worst kind of these wounds, that is, where a small wound passes through the tela cellulosa and aponeurosis to the pericranium, the patient will admit of more free evacuations by phlebotomy than in the former. In both, the use of warm fomentations is required; but an emollient cataplasm, which is generally forbid in the erysipelatous swellings, may in this latter case be used to great advantage. Where the symptoms are not very pressing, nor the habit very inflammable, this method will prove sufficient; but it sometimes happens that the scalp is so tense, the pain so great, and the symptomatic fever so high, that by waiting for the slow effect of such means the patient runs a risk from the continuance of the fever; or else the injured aponeurosis and pericranium, becoming sloughy, produce an abscess, and render the case both tedious and troublesome. A division of the wounded part, by a simple incision down to the bone, about half an inch or an inch in length, will most commonly remove all the bad symptoms; and if it be done in time, will render every thing else unnecessary.

Wounds penetrating into the Cavities of the Joints.

These do not seem at first alarming; yet, by exposure to the air, the lining membrane of such cavities acquire such a degree of sensibility as to endanger life when they are large. As soon therefore as any extraneous body, pushed into the joint, is removed, the admission of the external air is to be guarded against as much as possible. If the wound be not too large, this may be done by pulling the skin over the wound of the joint; and to prevent its retraction, rather adhesive plaster, with proper bandaging, is to be used. But when inflammation is come on, repeated and copious blood-letting, together with fomentations, become necessary; and as the pain, in these cases, is apt to be violent, opiates must be administered; but should matter be formed in the cavity of the joint, free vent must be given to it.

SECTION II. *Gun-shot Wounds.*

In gun-shot wounds, made by a musket or pistol ball, the most immediate considerations are, to extract the ball, or any other extraneous body which may have lodged in the wounded part; and to stop the hæmorrhagy, if there is an effusion of blood from the rupture of some considerable artery.

It is frequently necessary to enlarge the wound in order to extract the ball: and if it have gone quite through (provided the situation of the part wounded will admit of its being done with safety), the wound is to be laid freely open through its whole length; by which means any extraneous body will be more readily removed, and the cure facilitated.

In order to get at the ball, or any other foreign matter, probing is to be used as sparingly as possible: and this must evidently appear to any one who will only consider the nature of the symptoms attendant on penetrating wounds of the breast or belly, either from a bullet or sharp instrument; the thrusting in a probe to parts under such circumstances being unavoidably a fresh stab on every repetition of such practice. Wherever probing is necessary, the finger is to be preferred as the best and truest probe, where it can be used.

If a ball, or any other foreign body, happens to be lodged near the orifice, or can be perceived by the finger to lie under the skin, though at some distance from the mouth of the wound, we should cut upon it, and take it out: but when it is sunk deep, and lies absolutely beyond the reach of the finger, it must appear evident, upon the least reflection, that thrusting first a long probe in quest of the bullet, and then, as has been practised likewise, a longer pair of forceps, either with or without teeth, into a wound of that kind, though with a sort of certainty to extract it, must either contuse, or irritate and inflame, the parts to a great degree; and consequently do as much, or more mischief, than the ball did at first by forcing its passage such a length of way. And should they at the same time lay hold of any considerable artery or nerve along with the ball (which can scarce ever fail of being the case), what shocking consequences would attend such a proceeding! Nor would attempts of this sort be less injurious in case a bullet should happen to be lodged in the cavity of the belly or breast. Such attempts are the less necessary, because a great number of instances have occurred, where balls have been quietly lodged in several parts of the body, till after many years they have worked themselves a passage towards the surface, and were very easily extracted; and many where balls have been entirely left behind.

In case the wound be occasioned by a musket or pistol shot, and of course but small, it will be necessary to dilate it without delay, provided the nature of the part will admit of this with safety: for in wounds near a joint, or in very membranous or tendinous parts, the knife, as well as forceps, should be put under some restraint; nor should any more opening be made than what is absolutely requisite for the free discharge of the matter lodged within.

Where the wounded person has not suffered any great loss of blood, and this is generally the case, it will be advisable to open a vein immediately, and take from the arm a large quantity; and to repeat bleeding as circumstances may require, the second, and even the third day. Repeated bleedings in the beginning draw after them many advantages. They prevent a good deal of pain and inflammation, lessen any feverish assaults, forward the digestion, and seldom fail to obviate imposthumations, and a long train of complicated symptoms which are wont otherwise to interrupt the cure, miserably harass the poor patient, and too often endanger his life; and even where the feverish symptoms run high, and there is almost a certainty that matter is forming, bleeding, in that state, is very frequently of great advantage.

For the first 12 days it will be proper to observe a cooling regimen, both in respect of the medicines that may be prescribed, and the diet requisite for the support of nature. It is absolutely necessary likewise that the body be constantly kept open. Unless, therefore, nature does this office of herself, a stool should be every day procured, either by emollient clysters or some gentle laxative taken at the mouth; and whenever there is much pain in the wounded parts, immediate recourse must be had to opium.

Although no considerable hæmorrhagy may happen at first in gun-shot wounds; yet after the sloughs commonly produced upon such occasions have come off, some considerable arteries may be exposed, and then a dangerous hæmorrhagy may ensue. The hæmorrhagy is often preceded by a great heat in the injured parts, and with a throbbing pulsatory pain. At this period it may frequently be prevented by plentiful blood-letting, particularly local. But if the hæmorrhagy has fairly taken place, and from arteries of considerable size, nothing will do but the proper application of ligatures. As the discharge in these cases would often prove dangerous before the surgeon could be procured, the attendants should be furnished with a tourniquet, with directions to apply it, upon the first appearance of blood.

Till of late years the scarifying of gun-shot wounds was a practice which prevailed very universally among surgeons; and it was expected by this, that the sloughs with which wounds are sometimes covered would sooner separate, and that the cure would thereby be more readily performed. It is now, however, known, that this practice, instead of being useful, very generally does harm by increasing the inflammation. It should therefore be laid entirely aside. When a gun-shot wound cannot easily or safely be laid open from one end to the other, perhaps it may be proper to introduce a cord through the sinus. This, however, should not be attempted till the first or inflammatory state of the wound is over; but when a cord cannot be properly introduced, on account of the situation or direction of the wound, compression may prove equally useful here as in cases of punctured wounds.

If a mortification happen after a gun-shot wound, it is to be treated in the same manner as if it had arisen from any other cause, only bark is not to be promiscuously used; as, in plethoric habits, it may prove hurtful, though in debilitated relaxed habits it will be extremely useful; but even in such it should never be given while much pain and tension continue.

SECTION III. *Poisoned Wounds.*

Poison may be introduced into the system various ways. The effects of the poison introduced by the stings of insects may frequently be prevented by applying immediately vinegar, volatile alkali, or ardent spirits. After inflammation has supervened, the most effectual remedy is the washing the parts with cold water. The bite of a viper is not always dangerous; but as we can never judge with certainty whether the wound be poisoned or not, and as the poison of this animal acts very speedily upon the system, its bad effects ought to be prevented by every possible means. The injured part ought either to be cut out immediately, or destroyed with the actual or potential cautery: and in the case of poisonous serpents, great benefit has been derived from the application of a tight ligature above the wounded part, provided the wound occur in an organ to which a ligature can be applied.

Formerly, suction was much employed, and frequently with success: it should not, however, prevent the removal of the part. After the part has been removed, we should endeavour to produce a plentiful suppuration. When the poison appears to have entered the system, the application of warm oil over the whole body has been extolled; and it has been said that advantage has been derived from the internal use of it. From some late observations, however, the efficacy of this remedy is much to be doubted. Perhaps a plentiful sweat, kept up for a considerable time, is the most certain method yet discovered. Small doses of volatile alkali frequently repeated is more to be depended on for producing this effect than any other remedy.

The bite of a mad animal occasions the most formidable poisoned wound known in this country. In these wounds, hydrophobia indeed does not always ensue; but when it does, death is almost certainly the consequence. A variety of nostrums, for preventing and curing this disease, have been held forth to the public; but there is scarcely any well-attested fact of any one of them proving useful. Nothing yet known can be depended upon but the immediate removal of the injured part, either with the scalpel or the actual or potential cautery; which, together with a plentiful suppuration, has, in different instances, appeared to answer the purpose effectually; at least, patients treated in this manner have escaped, while others bit at the same time by the same animal have suffered. The sooner the operation is performed, the more effectual it is likely to prove; but it ought not to be omitted, even though some time has elapsed from the time that the wound was inflicted; for there is reason to suppose that this poison does not enter the system so quickly as several others are observed to do. Sea-bathing has been much recommended in all ages as a preventive; but there are few well-attested cases of its being attended with advantage. Many practitioners depend much on mercury; and as it can be used along with any other plan of treatment, it ought not to be neglected.

When wounds are poisoned by the application of matter from certain sores, as those of the venereal or cancerous kinds, or from any of the vegetable poisons, it is better to remove the part affected immediately, than to undergo a course of medicines generally slow and often doubtful in their operations.

The metallic poisons do not belong to this place; for however deleterious they may be when taken into the stomach, they seldom appear to be otherwise hurtful, when applied to wounds, than by irritating or corroding the parts with which they come in contact.

Chapter II. *Burns.*

The immediate consequence of burns is a greater or less degree of inflammation; and the danger attending such accidents is in proportion to the extent of the injury. Burns which irritate the skin only, without destroying the cuticle, act nearly in the way of a common blistering plaster. When the cuticle is destroyed, no blister takes place: a mortified slough is observed: and when this separates, an ulcer is left. Where the cuticle is not destroyed, relief may be procured by holding the part affected a considerable time in very cold water, or sometimes by plunging it two or three times into water a little below the boiling point. Solutions of saccharum saturni, and other preparations of lead, have been recommended, as in the case of other inflammations. Vinegar is found a very effectual application, whether the skin be sound or blistered. The part may be entirely immersed in it, or linen rags dipt in the vinegar may be applied, and the parts kept constantly moist, till the pain be removed. The same application is useful where the skin is rubbed off, or otherwise destroyed. In this case, indeed, the vinegar is apt to give additional pain on its first application; but this soon ceases, and the part becomes much cooler and easier. If the patient will not suffer the vinegar to be applied immediately to the surface of the sore, a linen rag soaked in olive-oil may be previously laid on the part, covering the whole with the cloths dipped in vinegar; and these applications are to be occasionally repeated till the pain and inflammation be entirely removed; after which the parts are to be dressed in the same manner as in the case of a common blister. In extensive burns, where the irritation is great, along with external applications, opium should be prescribed, in doses adequate to the degree of pain. Even that stupor with which patients in this situation are sometimes attacked is found to be more readily removed by opium than by any other remedy. With respect to the blisters which arise upon burns, it has been disputed whether they ought to be opened, or allowed to remain till they dry up of themselves. But, according to the opinions of the latest authors, they ought to be opened for the mere purpose of evacuating the fluid, as soon as any considerable quantity of fluid is found in them. After the serum is discharged, a thin liniment of wax and oil, with a little saccharum saturni, should be applied to the part.

In cases of very severe burns, where, notwithstanding the above treatment, there is danger of a violent inflammation being induced, blood-letting, cooling purgatives, and other remedies adapted to the peculiar symptoms, must be used. When, again, burns are from the first attended with the loss of substance, as commonly happens after the application of hot metallic bodies, we ought to have recourse to the vinegar, as already mentioned, or to a liniment which is now in very common use for such purposes, made of equal parts of linseed-oil and lime-water, which, when shaken together, forms a thick white substance, which often gives speedy relief; and it may be readily applied by daubing the parts frequently over with a soft pencil well soaked in it. Though this has been considered as one of the best applications in burns, yet in some cases, more immediate relief has been procured from the application of Goulard's cerate, or the unguentum nutritum; and a weak solution of saccharum saturni has sometimes been of service.

In very severe burns, if not accompanied with loss of flesh, the application of alkohol, brandy, or other distilled spirits, or oil of turpentine, has of late been strongly recommended; and we have ourselves known it to be accompanied with the very best effects. We cannot enter into the rationale of this success, though, had we time, we flatter ourselves we could readily explain it. When there is much loss of substance, the wound should be first covered over with finely powdered chalk, and then moistened with the preceding applications; and the parts affected should be thus kept constantly moist, and not suffered to become harsh and dry.

When burns are occasioned by the explosion of gunpowder, some of the grains of the powder are apt to be forced into the skin. At first they produce much irritation; and if they are not removed, they commonly leave marks which remain during life. They should, therefore, be picked out as soon as possible after the accident; and to prevent inflammation, as well as to dissolve any power which may remain, the parts afflicted should be covered, for a day or two, with emollient poultices. In other respects, injuries of this sort are to be treated like any other kind of burns.—When burnt parts are contiguous to each other, they are apt to adhere. To prevent this, pledgits covered with any proper dressing ought to be inserted between them during the course of the cure. Ulcers arising from burns are apt to become soft and fungous, and to rise above their natural level. When this is observed, the emollient ointments, which may have been previously used, should be laid aside, and those of a moderately astringent nature applied. Gentle compression with a roller is also of particular service. Advantage is likewise derived from saturnine washes, &c. One of the best ointments, in such cases, is the common calamine cerate. These will commonly answer the purpose: but when they prove insufficient, burnt alum, blue vitriol, or even lunar caustic, may be necessary.

Chapter III. *Ulcers.*

An ulcer is a chronic solution of continuity in any of the soft parts of the system discharging unhealthy pus, ichor, or sanies. They often proceed from wounds or contusions improperly treated, or occurring in a morbid habit of body; and sometimes from morbid habit alone without any external injury. It is called *callous*, if the lips of the wound be thick and indurated; *sinuous*, if it spread into lurking hollows or channels; and *carious*, if it be connected with a diseased and neighbouring bone.

In the callous form, the sore becomes foul, and discharges a nasty thin ichor, the edges of it, in process of time, tuck in, and, growing skinned and hard, give it the name of a *callous ulcer*; which, as long as the edges continue in that state, must necessarily be prevented from healing. But we are not immediately to destroy the lips of it, in expectation of a sudden cure; for while the malignity of the ulcer remains, which was the occasion of the callosity, the new lips will be subject to a relapse of the same kind, however often the external surface of them be destroyed: we are to endeavour to bring the body of the ulcer into a disposition to recover by other methods. It sometimes happens to poor laborious people, who have not been able to afford themselves rest, that lying a-bed will in a short time give a diversion to the humours of the part, and the callous edges, softening, will without any great assistance shoot out a cicatrix, when the ulcer is grown clean and filled with good flesh. The effect of a salivation is generally the same; and even an issue sometimes disposes a neighbouring ulcer to heal. But though callosities be frequently softened by these means, yet when the surface of the ulcer begins to yield thick matter, and little granulations of red flesh shoot up, it will be proper to quicken nature by destroying the edges of it, if they remain hard. The manner of doing this is by touching them a few days with the lunar caustic, or lapis infernalis. Some choose to cut them off with a knife: but this is very painful, and not more efficacious. When the lips do not tuck down close to the ulcer, but hang loose over it, as in some venereal buboes, the easiest method is to cut them off with the scissars.

To digest the ulcer, or to procure good matter from it when in a putrid state, there are an infinity of ointments invented; but the basilico flavum, alone, or softened down sometimes with turpentines, and sometimes mixed up with different proportions of red precipitate, seems to serve the purpose of bringing an ulcer to cicatrization as well as any of the others. When the ulcer is incarned, the cure may be finished as in other wounds: or if it do not cicatrise kindly, it may be washed with aq. calcis, or aq. phag. or dressed with a pledgit dipt in tinct. myrrhæ: and if excoriations are spread round the ulcer, they may be anointed with sperm. cet. ointment, or any other soft ointment.

The red precipitate has of late years acquired the credit it deserves for the cure of ulcers; but, by falling into general use, is very often unskilfully applied: when mixed with the basilicon, or, what is nearer, a cerate of wax and oil, it is most certainly a digestive, since it hardly ever fails to make the ulcer yield a thick matter in twenty-four hours, which discharged a thin one before the application of it.

If the ulcer produce a spongy flesh, sprouting very high above the surface, it will be necessary to destroy it by some of the escharotics, or the knife. This fungus differs very much from that belonging to healing wounds, being more eminent and lax, and generally in one mass; whereas the other is in little distinct protuberances. It approaches often towards a cancerous complexion, and when it rises upon some glands, sometimes actually degenerates into a cancer. When these excrescences have arisen in venereal ulcers, escharotics should be applied. Those in use are the vitriol, the lunar caustic, the lapis infernalis, and more generally the red precipitate powder.

It is but seldom that these inveterate funguses appear on an ulcer; but it is very usual for those of a milder kind to rise, which may often be made to subside by pressure and the use of mild escharotics: however, if the aspect of the sore be white and smooth, as happens in ulcers accompanied with a dropsy, and often in young women with obstructions, it will answer no purpose to waste the excrescences until the constitution is repaired, when most probably they will sink without any assistance. In ulcers also, where the subjacent bone is carious, great quantities of loose flabby flesh will grow up above the level of the skin: but as the caries is the cause of the disorder, it will be in vain to expect a cure of the excrescence until the rotten part of the bone be removed; and every attempt with escharotics will be only a repetition of pain to the patient, without any advantage.

When the pain and inflammation are excessive, bleeding and other evacuations will often be serviceable; and above all things, rest and a horizontal position; which last circumstance is of so great importance to the cure of ulcers of the legs, that unless the patient will conform to it strictly, the skill of the surgeon will often avail nothing: for as the indisposition of these sores is in some measure owing to the gravitation of the humours downwards, it will be much more beneficial to lie along than sit upright, though the leg be laid on a chair; since even in this posture they will descend with more force than if the body was reclined.

In ulcers of the legs, accompanied with varices or dilatations of the veins, the method of treatment will depend upon the other circumstances of the sore; for the varix can only be assisted by the application of bandage, which must be continued a considerable time after the cure. The neatest bandage is the laced stocking, which is particularly serviceable in this case; though also, if the legs be œdematous, or if, after the healing of the ulcers, they swell when the patient quits his bed, it may be worn with safety and advantage. There are instances of one vein only being varicose; which, when it happens, may be destroyed by tying it above and below the dilatation, as in an aneurism; but this operation should only be practised where the varix is large and painful.

Ulcers of many years standing are very difficult of cure; and in old people the cure is often dangerous, frequently exciting an asthma, a diarrhœa, or a fever, which destroys the patient, unless the sore break out again: so that it is not altogether advisable to attempt the absolute cure in such cases: but only the reduction of them into better order, and less compass, which, if they be not malignant, is generally done with rest and proper care. The cure of those in young people may be undertaken with more safety; and in all cases of stubborn ulcers, the bark very copiously given, will be found of the utmost service.

When an ulcer or abscess has any sinuses or channels opening and discharging themselves into the sore, they are called *sinuous.* These sinuses, if they continue to drain a great while, grow hard in the surface of their cavity, and then are termed *fistulæ,* and the ulcer a *fistulous ulcer*; also, if matter be discharged from any cavity, as those of the joints, abdomen, &c. the opening is called a *sinuous ulcer* or a *fistula.*

The treatment of these ulcers depends upon a variety of circumstances. If the matter of the sinus be thick, strict bandage and compress will sometimes bring the opposite sides of the sinus to a reunion; if the sinus grow turgid in any part, and the skin thinner, shewing a disposition to break, the matter must be made to push more against that part, by plugging it up with a tent: and then a counter opening must be made, which proves often sufficient for the whole abscess, if it be not afterwards too much tented, which locks up the matter and prevents the healing; or too little, which will have the same effect: for dressing quite superficially does sometimes prove as mischievous as tents, and for nearly the same reason; since suffering the external wound to contract into a narrow orifice before the internal one be incarned, does almost as effectually lock up the matter as a tent. To preserve, then, a medium in these cases, a hollow tent of lead or silver may be kept in the orifice, which at the same time that it keeps it open, gives vent to the matter. The abscesses where the counter opening is made most frequently are those of compound fractures, and the breast; but the latter do oftener well without dilatation than the former; though it must be performed in both, if practicable, the whole length of the abscess, when after some trial the matter does not lessen in quantity, and the sides of it grow thinner; and if the sinuses be fistulous, no cure need be expected without dilatation.

When an ulcer with loose rotten flesh discharges more than the size of it should yield, and the discharge is oily and stinking, in all probability the bone is carious; which may easily be distinguished by running the probe through the flesh: and if so, it is called a *carious ulcer*. The cure of these ulcers depends principally upon the removal of the rotten part of the bone, without which it cannot heal. Those caries which happen from the matter of abscesses lying too long upon the bone, are most likely to recover: those of lues venerea very often do well, because that distemper fixes ordinarily upon the middle and outside of the densest bones, which admit of exfoliation; but those produced by scrophula, where the whole extremities of the spongy parts of the bone are affected, are exceedingly dangerous. All enlarged bones are not necessarily carious; and there are ulcers sometimes on the skin which covers them, which do not communicate with the bone, and consequently do well without exfoliation: nay, it sometimes happens, though the case be rare, that, in young subjects particularly, the bones will be carious to such a degree, as to admit a probe almost through the whole substance of them; and yet afterwards admit of a cure, without any notable exfoliation.

The method of treating an ulcer with caries, is by applying a caustic of the size of the scale of the bone which is to be exfoliated; and after having laid it bare, to wait till the carious part can without violence be separated, and then heal the wound. In order to quicken the exfoliation, there have been several applications devised; but that which has been most used in all ages, is the actual cautery, with which surgeons burn the naked bone every day, or every other day, to dry up, as they say, the moisture, and by that means procure the separation: but as this practice is never of great service, and always cruel and painful, it is now pretty much exploded. Indeed, from considering the appearance of a wound, when a scale of bone is taken out of it, there is little doubt that burning retards rather than hastens the separation; for as every scale of a carious bone is flung off by new flesh generated between it and the sound bone, whatever would prevent the growth of these granulations would also in a degree prevent the exfoliation; which must certainly be the effect of a red-hot iron applied so close to it.

Some caries of the bones are so very shallow, that they crumble insensibly away, and the wound fills up; but when the bone will neither exfoliate nor admit of granulations, it will be proper to scrape it with a rugine, or perforate it in many points with a convenient instrument down to the quick. In scrophulous cases, the bones of the carpus and tarsus are often affected; and from their sponginess they are seldom cured; so that when these, or indeed the extremities of any of the bones, are carious through their substance, it is advisable to amputate; though there are instances in the scrophula, but more especially in critical abscesses, where, after long dressing down, the splinters, and sometimes the whole substance, of the small bones, have worked away, and a healthy habit of body coming on, the ulcer has healed; but these are so rare, that no great dependence is to be laid on such an event. The dressings of carious bones, if they are stinking, may be dossils dipt in the tincture of myrrh; otherwise those of dry lint are easiest, and keep down the edges of the ulcer better than any other gentle applications.

CHAPTER IV. *Contusions and Sprains.*

When the small vessels are broken by a blow with any hard instrument without penetrating the skin, at the same time that the solid fibres of the part are crushed, the injury is termed a *contusion*: and when at the same time the skin is broken, it is termed a *contused and lacerated wound*; because in this case the parts are not fairly divided as with a knife, but torn asunder, or violently stretched; and when the muscles or ligaments are wrenched by sudden violence, the injury is called a sprain.

Contusions of the integuments and muscles produce pain, swelling, and inflammation, and these, in some cases, may extend to a considerable degree; but in general they are less violent than what take place in cases of sprains of ligaments or tendons; for in these there is frequently a total loss of motion for many weeks, and sometimes for years, if proper attention be not paid. An effusion of fluids always succeeds the injury, which seems to be, for the most part, of a serous nature, as the skin usually retains its natural colour; sometimes the tumefied parts are of a deep red, or leaden colour, owing to a rupture of some vessels conveying red blood.

In the treatment of contusions and sprains, two circumstances require attention. 1. To endeavour to prevent the swelling as far as is practicable; 2. To employ those remedies afterwards which are known to be most powerful in preventing or removing inflammation. In contusions of the cellular substance, and even of the muscles, the effused fluids are commonly soon absorbed; but in sprains of the tendons or ligaments, a very troublesome, painful thickness of the injured parts is apt to continue for a great length of time, and in some instances even for life.

It is necessary, therefore, to obviate these symptoms as soon as possible; and for this purpose, cold astringent applications, as water, vinegar, &c. are most commonly used. Others again, with a view to relax the parts fully, make use of water as hot as the patient can bear it. By immersing the injured part in these immediately after the injury is received, the effusion will be at least diminished. When the pain is excessive, opiates become necessary. In sprains of tendinous parts, recovery is often a work of many months.

CHAPTER V. *Compressions and Concussions.*

The first of these is often, and the last always the result of external violence. They sometimes occur jointly, and sometimes separately. There is no organ that may not be seriously injured by either of these affections: but, perhaps, the severest sufferers are the kidneys, the stomach, and the brain. Bloody urine and ischury are frequent symptoms of the first; local agony, fainting, and at times instantaneous death, are attendants upon the second; and it is a curious fact that, if blood be drawn from the arm in the last case, it exhibits the same absence of coagulum or collapse as when death is produced by a stroke of lightning.

The terms, however, are more usually applied to the organ of the brain, in consequence of its being far more frequently the seat of these kinds of injury.

When the brain is compressed, a set of symptoms ensue extremely dangerous, though sometimes they do not make their appearance till after a considerable interval. But at whatever time they appear, they are uniformly of the same kind, and are in general as follow: drowsiness, giddiness, and stupefaction, dimness of sight, dilatation of the pupil; and, where the injury done to the head is great, there is commonly a discharge of blood from the eyes, nose, and ears. Sometimes the fractured bone can be discovered through the integuments, at others it cannot. There is an irregular and oppressed pulse, and snoring or apoplectic stertor in breathing. There is likewise nausea and vomiting, with an involuntary discharge of fæces and urine. Among the muscles of the extremities and other parts, there is loss of voluntary motion, convulsive tremors in some parts of the body, and palsy in others, especially in that side of the body which is opposite to the injured part of the head.

Some of the milder of these symptoms, as vertigo, stupefaction, and a temporary loss of sensibility, are frequently induced by slight blows upon the head, but commonly soon disappear, either by rest alone, or by the means to be afterwards pointed out. But when any other symptoms ensue, such as dilatation of the pupils, and especially when much blood is discharged from the eyes, nose, and ears, and that there is an involuntary discharge of fæces and urine, it may be reasonably concluded that compression of the brain is induced.

The cavity of the cranium, in the healthy and natural state, is every-where completely filled by the brain; whatever therefore diminishes that cavity will produce a compression of the brain.

The causes producing such a diminution may be of various kinds, as fracture and depression of the bones of the cranium; the forcible introduction of any extraneous body into the cavity of the cranium; effusion of blood, serum, pus, or any other matter; the thickness of the bones of the cranium in certain diseases, as in lues venerea, rickets, or spina ventosa; or water collected in hydrocephalous cases. The first set of causes shall be considered in their order. The four last belong to the province of the physician.

By concussion of the brain is meant such an injury from external violence as either obstructs or destroys its functions without leaving behind it such marks as to allow its nature to be ascertained by dissection.

Most of the symptoms attending compression of the brain occur also in concussion; but in a compressed state of the brain they are more permanent. There is no discharge of blood from the eyes, nose, or ears, which frequently happens in compression; and instead of that apoplectic stertor in breathing which accompanies compression, the patient seems to be in a sound and natural sleep. The pulse is irregular and slow in compression, and grows stronger and fuller by blood-letting; but in concussion it is weaker, being soft and equal, and sinks by blood-letting. There are besides convulsions in compressions, which are not observed in a state of concussion. The symptoms arising from concussion come on immediately after the injury is received. In the violent degrees of these, the patient remains quite insensible; the pupils are much dilated, and do not contract though the eyes be exposed to the strongest light.

In more violent symptoms, especially when the patient is rendered insensible, it is extremely difficult to distinguish between concussion and depression; for symptoms which have been supposed to arise entirely from concussion have, after death, been found to be owing to extravasation or undiscovered fracture; and extravasation has been blamed, when, on dissection, not the least morbid appearance could be discovered.

In concussion, the pulse will frequently sink and become feeble, even after the discharge of eight or ten ounces of blood: in doubtful cases, therefore, blood-letting should be practised with great caution. If the pulse become fuller and stronger, after discharging a moderate quantity, if the blood appear sizy, and especially if the patient become more sensible, it may be concluded that the symptoms depend upon extravasation, depression of the skull, or some degree of inflammation; and as long as advantage seems to be derived from blood-letting, we may repeat it: but if, upon drawing a few ounces of blood, the pulse become feeble, and especially if along with this the patient become more weakly, we should immediately desist from any farther evacuation of blood; and in place of it we ought to give such remedies as may support and strengthen the patient: cordials ought to be given internally, and stimulants applied externally. Warm wine should be given in proportion to the degree of debility induced; the patient, who is apt, in this case, to become cold, should be kept warm by proper coverings; a blister ought to be put to all that part of the head in which the skin has not been injured; sinapis should be applied to the feet; gentle laxatives are useful, and should be regularly given, so as to keep the body open. If the patient cannot swallow wine in sufficient quantity, volatile alkali, ardent spirits, and other cordials of a stimulating kind, should be given. In concussions of the brain, some have recommended the use of opiates, but other practitioners consider it as hurtful in the early stages of the disorder, and are of opinion that even wine and other cordials ought to be given with some degree of caution. Issues, or the frequent repetitions of blisters to the different parts of the head and neck, by which an almost constant stimulus is preserved, are much recommended. When patients are recovering from accidents of this kind, a liberal use of bark, steel, and mineral waters, &c. have sometimes been of service. When the stomach is loaded, gentle vomits become necessary; and white vitriol is reckoned the best in such cases. When much languor, inactivity, and loss of memory continue, electricity long applied has been attended with advantage. This remedy, however, would be hurtful where any symptoms of compression or inflammation of the brain are present.

PART I.

Division II.

HARD PARTS.

This portion of our treatise will necessarily include

Chapter I. *Luxations.*
——— II. *Fractures.*
——— III. *Amputations.*
——— IV. *Bandages.*

Chapter I. *Luxations.*

Section I. *Luxations in general.*

A bone is said to be luxated when that part of it forming a joint is moved out of its place. When the bone is forced entirely out of its cavity, the luxation is termed *complete*; when this is not the case, it is *partial* or *incomplete.* When there is also a wound of the soft parts communicating with the joint, it is called a *compound*, and when there is no wound, a *simple luxation.*

The common symptoms of a dislocated bone are, inability to move the injured limb; pain, tension, deformity in the part affected; and sometimes inflammation, subsultus tendinum, and fever: and these three last are greatest in partial dislocations. The swelling which first appears is always inflammatory; but afterwards a secondary swelling comes on, seemingly œdematous, and probably owing to the pressure of the lymphatics by the dislocated bone.

In judging of the practicability of reducing a luxation, we ought to attend to its nature and extent, the other circumstances with which it may be complicated, and the length of time which it has continued. When a bone is only partially dislocated, it is evident that it may be reduced with much more ease and certainty than where it is completely displaced. It is evident also that fracture attending dislocation must render reduction much more difficult and uncertain. Indeed, when both the bones forming the joint are broken, there is the greatest hazard of its remaining stiff during life, even when the greatest attention has been paid. Luxated bones are most easily reduced immediately after they are displaced; the difficulty indeed of reducing them is generally proportional to the time that has intervened since the accident happened. When a bone has been some time lodged among the contiguous muscles, it forms a socket for itself, and is firmly grasped by the surrounding soft parts. The cavity too, from which it was dislodged, may be partially filled with some of the surrounding soft parts, or at least diminished by the constant action of the contiguous muscles on its cartilaginous brim. Dissections, however, show, that inspissated synovia does not, as was formerly supposed, fill up this cavity. In delicate constitutions and advanced periods of life, when the muscles give little resistance, dislocations are more easily reduced than in the vigour of youth or in robust constitutions.

In the treatment, we ought, 1. To reduce the dislocation with as much ease and expedition as possible; 2. Retain the bone in its situation till the parts have recovered their tone; and, 3. Obviate all uneasy symptoms.

1. When the surrounding skin and muscles are much contused and inflamed, we should endeavour to remove the inflammation by local bleeding, saturnine applications, and laying the limb in an easy posture, before we attempt to reduce the bone, as considerable injury may be done by stretching a limb while the parts surrounding the joint are inflamed. The upper part of the limb should be kept steady while the surgeon endeavours to replace the under bone, which alone is commonly displaced. This is not easily done; for the contractile power of the muscles acts strongly against every attempt, and not only draws it beyond the contiguous bone against which it should be placed, but frequently forces it out of its natural situation, and fixes it firmly in some neighbouring cavity, from which it is with difficulty removed. To prevent this resistance as much as possible, the muscles ought to be put into a state of relaxation. If this is properly done, the force necessary for reducing a luxated bone may generally be obtained from assistants alone; sometimes, however, machinery is required, and various instruments have been invented for this purpose. Freke's machine is the most generally used. The force ought always to be applied in a gradual manner, and to the dislocated bone alone, and not to any more distant parts of the limb. After the end of the dislocated bone is brought into a line with that to which it is opposed, the reduction is easily completed either by the action of the muscles alone, or, if that is not sufficient, by gentle pressure.

2. After the reduction there is seldom any difficulty in retaining the bone in its place, unless it has often been dislocated before. All that is necessary is to place the limb in a relaxed posture, and to support the bone with a bandage till the parts have recovered their tone.

3. The most urgent symptoms which accompany dislocations are, pain, inflammation, and swelling. These usually abate soon after the reduction. If any degree of inflammation remain, the use of leeches is the best remedy.

When dislocated bones are accompanied with fracture near the joint, the fracture must be allowed to heal before reduction be attempted. This, however, is not always necessary in very small bones, as those of the fingers. When the fracture is at a distance from the joint, the dislocation may generally be reduced immediately. Compound luxations are to be treated nearly as compound fractures. After the bone is replaced, leeches should be applied to abate the inflammation; after which the sore should be dressed with Goulard's cerate, or any other mild ointment, and the pain moderated by opiates and a low regimen: care ought also to be taken that no matter lodge about the joint. When luxations are produced by tumours or collections of matter in the neighbourhood of the joints, they may be considered as incurable: when they proceed from too great a relaxation of the ligaments and tendons of the joint, the bone can hardly be prevented from being now and then displaced; but the inconvenience may be somewhat obviated by supporting the limb with a proper bandage, by the use of the cold bath, and by electricity.

Section II. *Luxations of the Bones of the Head and Neck.*

If the bones of the cranium be separated by external injury, all that can well be done is, to support the parts by a bandage, to prevent inflammation, to keep the patient quiet, and in a proper posture during the cure. The bones of the nose are seldom luxated without fracture: when they are, the injury is easily discovered by the touch. When one of the bones is driven inwards, it may be raised and reduced by pushing a tube of a proper size, and covered with soft lint, into the nostril; which may be afterwards retained till there is no danger of the bone being again displaced. If the bone be luxated outwards, it may be reduced by the fingers, and retained by a double-headed roller. The lower jaw is luxated most frequently when the mouth is opened widely; it can only take place forwards and downwards, which are least surrounded by the neighbouring parts: both sides are generally luxated at once; and in that case the mouth is opened wide, the chin thrown forwards and towards the breast. When only one side is dislocated, the mouth is distorted, and widest on the sound side of the jaw, which is drawn a little towards the contrary side. The patient should be seated, and his head supported. The surgeon should push his thumbs, protected by a covering of strong leather, as far as possible between the jaws, and then with his fingers, applied on the outside of the angle of the jaw, endeavour to bring it forward till it move a little from its situation. He should then press it forcibly down, and the condyles will immediately slip into their place. The thumbs ought to be instantly withdrawn, as the patient is apt to bite them involuntarily. The patient should for some time avoid much speaking or opening his mouth wide.

When the head is luxated, it commonly falls forwards on the breast, the patient is instantly deprived of sense and motion, and soon dies if the luxation be not quickly reduced. In reducing the luxation, the patient should be placed on the ground, and supported by an assistant: the surgeon standing behind, should gradually pull up the head, while the shoulders are pressed down by the assistant till the bones are brought into their place, which is known by a sudden crack or noise: if the patient be not dead, he immediately recovers his faculties, at least in some measure. He should then be put to bed with his head elevated and retained in one posture. He should lose a quantity of blood, and live for some time on a low diet.

Section III. *Luxations of the Spine, Os Coccygis, Clavicle, and Ribs.*

The vertebræ are sometimes partially, but hardly ever completely, dislocated without fracture. When they occur, high up, they are attended with the same symptoms as dislocation of the head: when farther down, besides distortion of the spine, paralysis ensues of every part of the body situated under the luxated bone; there is commonly also either a total suppression of urine, or it is discharged involuntarily together with the fæces. As luxations of this kind are generally owing to falls or violent blows, the displaced vertebra is driven either forwards or to one side; it is therefore very difficult to reduce it. The best, as well as the simplest method, is to lay the patient on his face over a cylindrical body, as a large cask, and at the same time to attempt to replace the bone with the fingers. If the bone be very much displaced, there is very little reason to hope for success. The os coccygis is more liable to dislocation than any other part of the spine. It is sometimes forced outwards in laborious births. This is discovered by the great pain which is felt at the connection of the os coccygis with the sacrum, and by the bone appearing to be displaced when examined. It may generally be easily reduced by pressure with the fingers. The best support afterwards is a compress, with the T bandage. When the coccyx is luxated inwardly, the patient complains of severe pain, tenesmus, and a sense of fulness in the rectum; the fæces are passed with difficulty, and in some cases a suppression of urine takes place. The injury is easily discovered by introducing the finger into the anus. In this case the bone should be pressed outwards, by introducing the fore and middle fingers of one hand dipped in oil into the rectum, and supporting the parts which correspond with it externally till the reduction is accomplished. Dislocations of these bones are apt to excite inflammation, which often terminates in dangerous abscesses; it ought therefore to be guarded against by every means in our power.

The clavicle is most frequently luxated at its junction with the sternum; because the violence which produces the injury is generally applied to the shoulder. The luxation is discovered by pain in the part, by the projection of the bone, and by the immobility of the shoulder. It is easily reduced by pushing the bone into its place with the fingers, while an assistant draws back the arms and shoulders. It is not so easy to retain the bone in its place. When it is the inner extremity of the clavicle which has been dislocated, the shoulder should be kept in its natural situation, neither raised nor depressed: the fore arm should be supported, as should also the head and shoulders, and a moderate pressure should be made upon the displaced end of the bone. For this purpose the machine lately invented by Mr. Park of Liverpool answers best. But when the outer extremity of the clavicle has been dislocated, the shoulder must be considerably raised, the arm supported in a sling, and the bone kept in its proper situation by a small compress placed over its end, and secured by a roller forming the figure 8; or it may be retained by the machine above mentioned. The bandage ought to be retained for a considerable time.

Luxations of the ribs are exceedingly rare. The symptoms are nearly the same with those arising from fracture, only that the pain is more severe at the articulation, and that no other spot but that will yield to pressure. All that can be done is to bend the body forward over a cask or some such body, in order to assist the viscera in pressing out the rib. Bandages are of little use. The patient should be kept quiet, and fed on a low diet: inflammation should be prevented, and opiates given if he has a troublesome cough.

Section IV. *Luxation of the Bones of the Superior Extremities.*

The head of the os humeri is most frequently dislocated forwards and downwards, sometimes downwards and backwards, but never upwards without a fracture of that part of the scapula which is placed above the joint. The luxation is discovered by the patient's inability to raise his arm, by violent pain attending the attempt, by the luxated arm being of a different length from the other, by the head of the humerus being felt out of its natural situation, while a vacuity is perceived under the acromion, and by the flatness of the injured joint, while the sound one has its natural fulness. When the luxation is of long standing, the whole arm is apt to become œdematous.

The patient should be seated on a chair, and his body secured by a broad belt passed round it, and held by assistants. The elbow should be bent, in order to relax the muscles on the fore part of the luxated joint. A firm leather belt four or five inches broad, with strong straps, and lined with flannel, is to be tied round the arm immediately above the elbow: assistants are to extend the arm gradually, by pulling these straps, while another assistant draws back the scapula. The surgeon stands on the outside of the arm, directs the assistants, and varies the direction of the extension, according to the situation of the head of the bone. As soon as the head of the bone has cleared the brim of the socket, the muscles draw it into its place, a crack is heard, the patient is relieved, and the anterior part of the shoulder acquires its usual fulness.

Various other methods of extending the arm have been proposed in difficult cases; as, suspending the patient by the luxated arm over the step of a ladder or the top of a door, raising him up by the arm with ropes running over pulleys fixed in the cieling of a room, &c. The jerk produced by the body being suddenly raised and let down again on a feather bed, have sometimes succeeded when other means have failed. A gentler method is to lay the patient on the floor, while two or three stout men standing on a table lay hold of him by the arm and pull him up. But all these methods are in danger of lacerating the soft parts by the suddenness with which the force is applied, and even sometimes of breaking the end of the humerus if it be pressed against the neck of the scapula. Mr. Freke's improvement on the ambé of Hippocrates has been considered as the best machine for extending the arm. But machinery is very seldom necessary; even cases of long standing may by proper management be reduced by means of assistants, providing reduction be at all practicable. Inflammation after the operation should be obviated by the usual remedies. If the bone be apt to step out again, which sometimes happens after repeated dislocations, the arm should be supported in a sling till the parts have recovered their tone. Blisters, friction, stimulating medicines applied to the shoulder, and cold water poured on it, have sometimes been useful in restoring the strength of the joint.

Luxations at the elbow most commonly happen upwards and backwards; and then the fore-arm is shortened, the end of the ulna projects behind, and is higher than usual, while the extremity of the humerus can be felt in the bend of the elbow. The surgeon should take hold of the wrist with one hand, and the upper part of the fore-arm (which is to be moderately bent) with the other, and gradually pull the top of the fore-arm downwards, while at the same time he increases the curvature of the elbow to disengage the ends of the bones from each other. He should then pull the bones forward into their situation. When the luxation happens upwards and forwards, it should be reduced while the arm is extended. After the reduction, the muscles of the fore-arm should be kept relaxed by bending the elbow a little till the parts have recovered their tone. When the bones of the fore-arm are dislocated from each other, which happens most frequently at the wrist, the rotatory motion of the hand is destroyed. After the reduction, the bones should be bound together by a tight flannel roller, or a couple of splints should be applied along the fore-arm, and the arm supported in a sling.

The bones of the wrist are not so often luxated as might be expected from the smallness of their size. When they are, great swelling and pain ensues, and the motion of the joint is entirely destroyed. Great attention is necessary, lest luxation should be mistaken for a sprain. The arm and hand should be supported by assistants, but not stretched; and then the bones should be pushed into their place, and afterwards retained by proper bandages and splints. The bones of the metacarpus, when they happen to be dislocated, which is very seldom, are to be reduced in the same manner. Dislocations of the thumb or fingers are easily discovered. To reduce them, an assistant should hold the phalanx from which the dislocation happened, while the surgeon endeavours to elevate the bone from the one contiguous to it, and to pass it into its place.

Section V. *Luxations of the Bones of the Inferior Extremities.*

From the great strength of the hip joint, it was formerly believed that the head of the thigh-bone was never luxated by external violence; but it is now known that it happens by no means unfrequently. The ball, in starting from its socket, generally passes forwards and downwards into the foramen thyroideum. When this happens, the limb is considerably lengthened, the head of the bone is lodged near the under and fore part of the pelvis, the large trochanter is observed on the fore part of the thigh, a vacancy is perceived where the head of the bone and the trochanter should be, and the toes are turned outwards. When the bone is dislocated upwards and backwards, the limb is shortened, the great trochanter higher than usual, the knee and foot turned inwards. When it is dislocated upwards and forwards, the leg is shortened, the ball of the bone is felt on the os pubis in the groin, and the great trochanter on the upper and lower part of the thigh; a vacancy is discovered in the corresponding part of the hip; the knee and toes are turned outwards. When the ball slips downwards and backwards, the leg is lengthened, the toes turned inwards, and the great trochanter is lower than that of the other limb. If the ball slip directly downwards, the leg is lengthened, but the knee and toes keep nearly their natural situation. It is sometimes difficult to distinguish between luxation and fracture of the neck of the bone. In fractures the bone is most frequently pushed upwards, and the leg shortened, the knee and point of the toes are turned inwards, and may be moved much more readily outwards and inwards than when the bone is dislocated.

For reduction, the patient should be laid on a mattress on the sound side, and a wooden roller covered with several folds of flannel placed between his thighs, and fixed firmly by straps to the wall. A strong bandage of buff leather, or something similar, should be applied to the under end of the thigh, with straps fixed to it to make the extension. The trunk of the body should be properly secured, and the joint of the knee bent. The extension should be made at first gently, and increased gradually, while, at the same time, the thigh is made to roll in different directions. When the extension is sufficient, two assistants should lay hold of the roller, and attempt to raise the bone; the extending force should then be slackened, and the surgeon should push the head of the bone upwards and outwards, while an assistant presses the knee forcibly inwards. The muscles themselves will then commonly bring the bone into its place; and this is done with such a jerk and noise, that it is heard by the by-standers. If the reduction be not obtained, the extension must be repeated with greater force. Instead of the roller, a broad strap or table cloth is frequently used. The limb should not be used for some time after reduction, and inflammation should be prevented by the proper remedies.

The patella can neither be luxated upwards or downwards, without rupture of the tendons of the extensor muscles, or of the strong ligament which fixes it to the tibia; but it may be luxated to either side. The luxation produces lameness, and much pain on attempting to move the joint. In recent cases the injury is easily discovered; but when the surgeon is not called immediately, the swelling may be so great as to render it more difficult. For reduction, the limb should be kept extended; the surgeon, by depressing the edge of the patella most distant from the joint, is enabled to raise the other, and push the bone into its place.

It may be necessary to remain a day or two in bed till the knee recover its tone. Sometimes, after the bone has been displaced, returns of the same complaint become frequent. In such cases, proper machinery applied to the side of the tumour, where the bone is apt to start out, is used with advantage.

From the size of the joint, and the great strength of the ligaments, luxations of the tibia from the os femoris rarely occur. When it does, it is easily discovered by the pain, lameness, and deformity of the limb. The patient should be laid on a table, the muscles relaxed, and the thigh secured by assistants; the limb should then be extended, and the bones cleared of each other, when they will be easily replaced. After the reduction, the limb should remain for some time perfectly at rest; and inflammation, which is very apt to ensue, and is attended with very bad consequences, should be assiduously guarded against.

If the ankle joint be dislocated forwards, the fore part of the foot is lengthened; if backwards, the foot is shortened and the heel lengthened (this is the most common variety); if to either side, there is an uncommon vacancy on the one side, and a prominency on the other. Dislocation, however, can hardly take place outwardly without fracture of the end of the fibula.

For reduction, the limb should be firmly held by assistants, the muscles relaxed, and extension made till the bones are cleared of each other, when the astragalus will easily slip into its place.—The same rules should be observed in reducing dislocations of the bones of the foot. Luxations of the metatarsal bones and toes are reduced exactly in the same manner as the bones of the metacarpus and fingers.

Chapter II. *Fractures.*

Section I. *Fractures in general.*

The term fracture is generally confined to such divisions in bones as are produced by external injury. When the integuments remain sound, the fracture is called *simple*; when it communicates with a wound, it is called *compound.*

The general symptoms of fracture are pain, swelling, and tension in the contiguous parts. A grating noise when the part is handled, distortion, and a certain degree of loss of power in the injured part, accompany almost every fracture, except when it runs longitudinally, and the divided parts are not completely separated from each other, or when the fracture occurs in the cranium. Where there is only a single bone in a limb, a fracture is easily detected; but where only one of two bones of a limb has suffered, it is often difficult to judge with certainty, especially if the contiguous soft parts be tense and painful before the practitioner is called. In that case, the opinion must be regulated, not only by the attendant symptoms, but, 1st, By the age and habit of the patient; for bones are more easily fractured in old than in young persons. Different diseases, too, induce brittleness of the bones, as the lues venerea and sea-scurvy. 2d, By the situation of the part; for bones are more apt to be fractured in the solid parts of their bodies than towards their extremities, where they are more soft and pliant. 3d, By the posture of the limb; for a weight may fracture a bone lying on an unequal surface, which it would have sustained without injury if equally supported. Fractures are sometimes attended with a great degree of echymosis, occasioned by the ends of the fractured bones wounding some of the contiguous blood-vessels.

In giving a prognosis of fracture, various circumstances are to be attended to. It is evident that small fractured bones are more easily healed than large ones, and that the fracture of the middle of a bone is not near so dangerous as near the extremity. A cure is effected much more readily in youth than in old age, and in good constitutions than in bad. We ought also to attend to the concomitant symptoms, and the injury which the neighbouring parts may have sustained. The more moderate the symptoms, the more favourable our prognosis may be.

The treatment of fractures consists of three particulars; replacement, retention, and obviating bad symptoms.

1. When bones are fractured directly across the parts, they are often very little moved from their natural situation; but when the fracture is oblique, they are apt to pass over each other,

and to produce much uneasiness and deformity; the contiguous muscles are severely injured, and the pain is aggravated by the slightest motion. The surgeon should put the limb into the best posture for relaxing all the muscles connected with it, according to the practice first introduced by Mr. Pott. If it be properly attended to, the ends of the bones will in general be easily replaced. When any difficulty occurs, a small degree of extension may be made, taking care to keep the muscles as relaxed as possible. Much attention should be paid to replacing the bones properly, otherwise the limb will remain for ever after distorted.

2. After the bones are replaced, the limb should be laid in the easiest posture, and the bones afterwards retained in their situation by proper compresses and bandages, not applied too tightly, till the cure be completed. The time necessary for this purpose depends on the size of the bone, the age and habit of the patient, the steadiness with which the limb has been retained in its place, and the violence of the attending symptoms. In middle-aged persons, and under favourable circumstances, a fracture of the thigh bone, or of the bones of the leg, may be cured in two months; of the arm bone, or bones of the fore-arm, in six weeks; of the ribs, clavicles, and bones of the hand, in three weeks. In infancy the cure will take a shorter, and in old age a longer, time than this.

3. In simple fractures the inflammatory symptoms generally subside in a few days. When they become worse, which is sometimes the case, astringent applications should be employed. If these fail, blood ought to be drawn from the parts affected. This is of so much advantage, that it ought never to be omitted where the surrounding soft parts are much injured. Friction, with emollient oils, warm bathing, the use of bath and other similar waters, are also of much service. The limb sometimes puts on a clumsy appearance from an overgrowth of callus. When this tendency appears, ardent spirits and other astringents are considered as useful; sometimes pressure on the part by a thin plate of lead fixed by a bandage may be advantageous. Many instances occur, however, where no remedies prove successful: the patient ought therefore to be acquainted beforehand with the probable event, to prevent unpleasant reflections afterwards.

Sometimes the ends of the bone remain loose long after they might have been reunited. This may be owing to some constitutional disease, to the bones not being kept steadily in contact, to some of the soft parts getting in between them, or to the bone being broken in different places, and the intermediate fractures being too small to adhere. Pregnancy has also been mentioned as a cause. By removing these obstructions, a perfect union may in recent cases be accomplished. But where the case is of long standing, callus of the bones becomes so hard and smooth as to move with the ease of a joint, so that no advantage can be derived from laying them together. In that case, an incision should be made through the soft parts, and a small portion of the ends of the bone removed with a saw. If this be properly performed, nature will supply the deficiency. When small pieces of bone remain long loose, they should be extracted by making an opening. The intervention of muscles or other soft parts is known by the very severe pain and tension, and by particular motions of the limb causing great pain and twitching of the muscles which move it. The limb should be put into all the variety of situation; and if this does not succeed, an opening must be made, and the soft parts removed. Sometimes in fractures blood-vessels are ruptured by the sharp spiculæ of the bone: this happens most commonly in compound fractures. When the effusion of blood is great, the part swells so much that it is necessary to lay it open, and to secure the divided vessels by a ligature. When the swelling is not great, the absorption of the blood is trusted to nature. When the blood remains long in contact with the fractured bone, it sometimes prevents the formation of callus; the periosteum separates from a considerable portion of the bone, and a thin fetid sanies is discharged at the wound. When this happens, no cure can be expected till the parts of the bone deprived of periosteum have exfoliated, or have been separated by a saw.

The preceding observations apply for the most part to fractures of the limbs. But there are many bones so peculiarly formed or situated, or a fracture in which produces such peculiar symptoms, that it is necessary to notice them more particularly; while even the bones of the limbs themselves require a difference of attention and management according to their situation. We shall next, therefore, follow them up as briefly as possible in their order.

SECTION II. *Fractures of the Cranium.*

Fractures of the cranium have been differently distinguished by different authors; but it seems sufficient to divide them into those attended with depression, and those which are not so.

In fracture and depression of the cranium, the treatment ought to be, 1. To discover the situation and extent of the fracture. 2. To obviate the effects of the injury done to the brain, by raising or removing all the depressed parts of the bone. 3. To endeavour to complete the cure by proper dressings, and attention to the after-treatment.

When the teguments corresponding to the injury done to the bone are cut or lacerated, and, as is sometimes the case, entirely removed, the state of the fracture is immediately discovered; but when the integuments of the skull remain entire, even though the general symptoms of fracture be present, there is sometimes much difficulty in ascertaining it. When, however, any external injury appears, particularly a tumor from a recent contusion, attended by the symptoms already described, there can be no doubt of the existence of a fracture. But it sometimes happens that compression exists without the smallest appearance of tumor. In such cases, the whole head ought to be shaved, when an inflammatory spot may frequently be observed. Sometimes the place of the fracture has been discovered by the patient applying the hand frequently on or near some particular part of the head.

When the symptoms of a compressed brain are evidently marked, no time ought to be lost in setting about an examination of the state of the cranium, wherever appearances point out, or even lead us to conjecture, in what part a fracture may be situated. For this purpose an incision used formerly to be made instantaneously upon the spot through the integuments, and the surface of the bone sufficiently exposed to admit of a free examination.

Upon the discovery of a fissure, and indeed in all cases of a fractured skull, and often in cases of compression alone, Mr. Pott was accustomed to trepan. In modern practice, however, this is by no means done so commonly, either in our own country or in France. Abernethy, J. Bell, and Desault, have jointly contended that even depression itself is not always a sufficient indication to warrant the application of the trephine; and each of these excellent writers have advanced cases in proof that after the inflammatory symptoms, the effects of concussion have been removed by a bold use of purging and an antiphlogistic regimen, the patient has done well, and no inconvenience ensued from the depression.

But though this is generally the case, it does at times happen, that the pressure in the brain, by a depressed portion of the bone, may render its elevation necessary. "If," observes Mr. Abernethy, "from a peculiar disposition of the brain to be affected by pressure, the torpor of that organ should continue; or if, after inflammation of the brain has taken place, the pressure should then appear to be particularly injurious, the elevation of the bone ought not, I think, to be deferred."

If, after the application of the trephine, no mark of injury appear either in the outer or inner table in that part, or in the dura mater below it, and the symptoms of a compressed brain still continue, a fracture in some other part is to be suspected; or that kind of fracture termed by practitioners *counter fissure*, where the skull is fractured and sometimes depressed on the opposite side to, or at a distance from, the part where the injury was received. This is fortunately not a very frequent occurrence, and has even been doubted by some; but different instances of it have, beyond all question, been found. If therefore the operation of the trephine have been performed, and no fracture be discovered, no extravasation appear on the surface of the brain; and if blood-letting and other means usually employed do not remove the symptoms of compression, the operator is to search for a fracture on some other part. The whole head should again be examined with much accuracy; and, by pressing deliberately but firmly over every part of it, if the smallest degree of sensibility remains, the patient will shew signs of pain, either by moans or by raising his hands, when pressure is made over the fractured part. In this way fractures have been frequently detected, which might otherwise have been concealed.

Having thus considered every thing preparatory to the operation of the trepan, we shall next point out the means best adapted for the removal or elevation of a depressed portion of the bone.

The first thing to be done is, after shaving the head, to make an incision as deep as the bone, and directly upon the course of the fracture.

The patient ought to be laid on a table, with a mattress under him, while his head is placed upon a pillow, and secured by an assistant. When the extent of the fracture has been determined, and the bleeding from the incision stopped, the depressed bone is now to be elevated; but previous to this it is necessary to search for detached pieces. Should any be found, they ought to be removed by a pair of forceps adapted to this purpose. By the same instrument any splinters of bone which may have been beaten in may be removed; but when a part of the bone is beaten in beyond the level of the rest of the cranium, as much of the pericranium is then to be removed by a raspatory as will allow the trephine to be applied; or, if the operator incline, for the sake of dispatch, he may use the trepan, which, however, though more expeditious, is much less safe in the application. The operation indeed may be begun and finished with the trephine, while the trepan may perform the middle and principal part of the work. This part of the work is commenced by making a hole with the perforator deep enough to fix the central pin of the trephine, in order to prevent the saw from slipping out of its central course, till it has formed a groove sufficiently deep to be worked steadily in; and then the pin is to be removed. If the bone be thick, the teeth of the saw must be cleaned now and then by the brush during the perforation, and dipped in oil as often as it is cleaned, which will considerably facilitate the motion, and render it more expeditious; making it at the same time much less disagreeable to the patient, if he possess his senses. That no time may be lost, the operator ought to be provided with two instruments of the same size, or at least to have two heads which can be readily fitted to the same handle.

After having made some progress in the operation, the groove ought to be frequently examined with a pick-tooth, or some such instrument, in order to discover its depth; and if one side happen to be deeper than the other, the operator ought to press more on that side which is shallowest. Precautions are more particularly necessary when the operation is performed upon a part of the skull which is of an unequal thickness, especially after the instrument has passed the diploe. And though it be said by writers in general that the instrument may be worked boldly till it comes at the diploe (which is generally known by the appearance of blood), yet the operator should be upon his guard in this point, examining from time to time if the piece be loose, lest through inadvertence the dura mater be wounded; for in some parts of the skull there is naturally very little diploe, and in old subjects scarcely any. It ought likewise to be remembered, that the skulls of children are very thin. When the piece begins to vacillate, it ought to be snapped off with the forceps or levator; for the sawing ought by no means to be continued till the bone be quite cut through, otherwise the instrument may plunge in upon the brain, or at least injure the dura mater.

When the skull is injured over a suture, and it is not thought adviseable to use the trephine, a perforation ought to be made on each side of the suture, especially in young subjects, in whom the dura mater adheres more strongly than in adults; because there cannot be a free communication between the one side and the other, on account of the attachment of that membrane to the suture.

After the elevation of the depressed pieces, or the removal of those which are quite loose, the extraction of extraneous bodies, and the evacuation of extravasated fluids, &c. the sore is to be dressed in the lightest and easiest manner; all that is necessary being to apply a pledget of fine scraped lint, covered with simple ointment, to that part of the dura mater which is laid bare by the trepan, or otherwise; after which the edges of the scalp are to be brought together or nearly so, and another pledget laid along the whole course of the wound; a piece of fine soft linen is to be laid over all, and the dressings may be retained in their place by a common night-cap applied close to the head and properly fixed.

The patient is to be placed in as easy a position in bed as possible, with his head and shoulders elevated a little more than ordinary. If the operation be attended with success, the patient will soon begin to shew favourable symptoms; he will soon shew signs of increasing sensibility, and the original bad symptoms will gradually disappear. After this he ought to be kept as quiet as possible; proper laxatives are to be administered, and such as may be least of a nauseating nature. His food ought to simple and easy of digestion, and his drink of the most diluent kind. If he complain of the wound being uneasy, an emollient poultice should be immediately applied, and renewed three or four times in the twenty-four hours. By these means there will commonly be a free suppuration from the whole surface of the sore.

Every time the wound is dressed, the purulent matter ought to wiped off with a fine warm sponge; and if any degree of sloughiness take place on the dura mater or parts adjacent, it will then be completely separated. Granulations will begin to form, which will continue to increase till the whole arise to a level with the surface of the cranium. The edges of the sore are now to be dressed with cerate straps, and the rest of it covered with fine soft lint, kept gently pressed on by the night-cap properly tied. In this way the cure will go on favourably; luxuriance of granulations will commonly be prevented; the parts will cicatrize kindly; and as all the skin has been preserved in making the first incision, the cicatrix will be but little observed.

SECTION III. *Fractures of the Bones of the Face.*

Fractures of the nose may impede respiration, affect the speech and sense of smelling, give rise to polypi and tedious ulcers, and may besides be dangerous from their vicinity to the brain. When any part of the bones of the nose has been raised above the rest, it is to be pressed into its place with the fingers; if it has been pushed into the nostril, it is to be raised with the end of a spatula or other similar instrument. If any portion be almost entirely separated from the rest, it should be removed; but if it adheres with considerable firmness, it is to be replaced. If the bones, after being replaced, do not remain in their proper situation, they are to be retained either by tubes introduced into the nostrils, or by a double-headed roller, with proper compresses as the case may require. Inflammation should be prevented by the proper remedies.

Much care is necessary in replacing the fractured bones of the face, and in dressing them, in order to prevent deformity. The dressings may be retained by adhesive plasters. Inflammation, by which the eyes, nose, or antrum maxillare, are apt to be injured, should be prevented. When matter collects in the antrum, it is to be removed by the methods already described.

For replacing fractures of the lower jaw, the patient should be seated in a proper light, with his head firmly secured. The surgeon should press with one hand on the inside of the bone, while with the other he guards against inequalities on the outside. If a tooth come in the way, it should be extracted; when any of the others are forced out of their sockets, they should be replaced, and tied to the neighbouring teeth till they become firm. The fractured parts being kept firm by an assistant, a thick compress of linen or cotton should be laid over the chin, and made to extend from ear to ear over it; a four-headed roller should be applied firm enough to keep the fractured parts in contact. The patient should be kept quiet during the cure, and fed upon spoon-meat. The dressings should be removed as seldom as possible. When the fracture is accompanied with an external wound, the parts should be supported by an assistant during the dressing of it.

SECTION IV. *Fractures of the Clavicles, Ribs, Sternum, and Spine.*

A fracture of the clavicle is easily discovered by the grating noise in the fractured bone upon moving the arm freely, by the ends of the bone yielding to pressure, and by the motion of the humerus being impeded. All that can be done is to raise the arm, and support it at a proper height, either by a sling, or, which is better, by the leather case recommended in case of luxation of this bone. By this the fractured parts will be brought together, so far at least as to prevent deformity, and render the bone sufficiently strong.

Fractures of the ribs are discovered by pressures with the fingers. The symptoms are commonly moderate, and the patient soon gets well. In some cases, however, the pain is severe, the breathing becomes difficult, attended with cough, and perhaps with spitting of blood, and the pulse is quick, full, and sometimes oppressed. These symptoms arise from the ribs being beat in on the lungs.

In the treatment, it is proper in every case to discharge some blood. If one end of the rib rise, it ought to be repressed by moderate pressure; and to prevent its rising again, a broad leather belt should be applied pretty tight, and continued for some weeks. When a portion of the rib is forced inwards, an opening should be made over it with a scalpel, and then it should be elevated with the fingers or a forceps. When distressing symptoms proceed from air or blood collected in the cavity of the chest, these fluids ought to be discharged by an operation.

The symptoms of a fractured sternum are nearly the same with those of the ribs. It requires great attention from the vicinity of the heart and large blood-vessels. The patient ought to lose a quantity of blood, and be kept on an antiphlogistic regimen. If the pain, cough, and oppressed breathing, do not yield to these remedies, an incision should be made on the injured part, and the depressed piece raised with a levator. Should this be insufficient, it may be effected by means of the trepan: this indeed requires the greatest caution, but it may certainly be attended with advantage when the patient's life is in danger.

Fractures of the vertebræ generally end fatally. We judge of the existence of fracture there by examining the parts, by the severity of the pain, and by palsy occurring in the parts situated below the injured part.

When any parts of the vertebræ near the integuments are loose, they may be replaced with the fingers, and retained by proper bandages. When this is impossible, some of the latest authors think it advisable to make an incision, and raise any portions of the bone which may be depressed.

SECTION V. *Fractures of the Bones of the Superior Extremities.*

The scapula is seldom fractured; when it is, the fracture is easily discovered by the pain, the immobility of the arm, and by the touch. The parts may be replaced with greater ease if the muscles connected with them be relaxed. They are retained with difficulty. A long roller should be employed for this purpose, with which the head and shoulders are also to be supported. The arm should also be suspended to relax the muscles as much as possible, and inflammation particularly guarded against by local bleedings.

Fractures of the humerus are easily discovered by the pain, the immobility of the arm, and a grating noise on handling the parts. In reducing the fracture, the muscles should be completely relaxed by bending the arm and raising it to a horizontal posture. Extension, if necessary, may be made by one assistant grasping the arm between the fracture and the shoulder, and another between the fracture and the elbow. After the reduction, one splint covered with flannel should be laid along the whole outside, and another along the whole inside of the arm; and then a flannel roller applied sufficiently tight to support the parts without interrupting the circulation. The arm may either be supported in a sling or Mr. Park's leather case. The bandages should not be removed for several days, unless some urgent symptoms render it necessary. In about a week, however, the arm should be examined to see whether the bones have been properly set.

When both of the bones of the fore-arm are broken, the fracture is easily discovered; but when only one bone is fractured, especially if it be the radius, the firmness of the other renders the discovery more difficult; the grating noise, however, on moving the bone in different directions, will generally be a sufficient symptom that a fracture has taken place. When the fracture happens near the wrist, particular attention is necessary in order to prevent a stiff joint. In order to replace the parts, the muscles are to be relaxed by bending the joints of the elbow and wrist, and the limb extended a little above and below the fracture. After reduction, a splint reaching from the elbow to the ends of the fingers is to be applied along the radius, and another along the ulna; and both are to be secured with a roller or twelve-tailed bandage. When the splints are applied, the palms should be turned towards the breast as the most convenient posture. The arm should be hung in a sling. A partial dislocation of the bones of the wrist sometimes attends a fracture of the radius, by which a stiff joint, under the best practice, is apt to ensue, or permanent painful swellings of the fore-arm. In such cases, the patient ought to be warned of the danger, that no blame may be afterwards incurred.

When the olecranum is fractured, the arm must be kept in an extended state during the cure, by applying a splint opposite to the joint of the elbow, reaching from the middle of the humerus to the points of the fingers. The arm should be hung by the patient's side, to which it should be fixed by means of straps. To prevent the consequences of a stiff joint, the dressings should be removed about the eighth or tenth day, the fore-arm for some time slowly moved backwards and forwards, and the joint rubbed with an emollient oil. By a repetition of this at proper intervals, a stiff joint may be prevented.

Anchylosis, or stiffness of the joint, commonly succeeds fractures of the bones of the wrist, owing to the great inflammation which ensues, and to their not readily re-uniting from their smallness. To prevent this as much as possible, after replacing the bones, the injured parts should be leeched freely, and in proportion to the violence of the symptoms. Splints should be applied exactly as in fractures of the fore-arm, and the arm supported by a sling.

In fractures of the metacarpal bones, a firm splint should be applied over the whole palm and inside of the arm, from the points of the fingers to the elbow, in order to prevent the action of the flexors of the fingers. The best splint for a fractured finger is a piece of firm pasteboard properly fitted and softened in water till it can be readily moulded into the form of the part. This should be applied along the whole length of the finger, and secured with a narrow roller. At the same time, a large roller should be applied over the inside of the hand to prevent the parts from being moved. To prevent stiffness, the dressings should be removed about the end of the second week, and the joint cautiously bent; and this should be repeated daily till the cure be completed.

SECTION VI. *Fractures of the Bones of the Inferior Extremities.*

Fractures of the body of the thigh-bone are readily discovered by the grating noise when the ends of the bones are forcibly rubbed together, by the shortness of the limb if the fracture be oblique, and by the limb being unable to sustain the body. But fractures of the neck of the bone are often not easily distinguished from dislocation of the joint. In general they may be distinguished by the circumstances mentioned in treating of luxations of this bone. In forming a prognosis, we ought to consider that no fractures are more apt to disappoint our expectations than those of the thigh, especially when the neck of the bone is broken, owing to the difficulty of discovering the place of the fracture, and of retaining the bones even after they have been replaced. In order to reduce fractures of the thigh, the muscles are to be relaxed by moderately bending the joints of the thigh and knee: when this is done, unless there be much pain and tension, the bones are easily replaced by one assistant holding the upper part of the thigh, while another supports and gently pulls down its lower extremity, while the surgeon is employed in adjusting the fractured pieces. It is more difficult to reduce fractures of the neck of the bone, on account of the great strength and various directions of the surrounding muscles. In general, however, we shall succeed by moderate extension, if we take care previously to relax all the muscles as much as possible: if we do not succeed, we must have recourse to machinery.

The greatest difficulty is to retain the bones in their situation after they are replaced. The limb must be firmly secured by splints made of thin slips of wood glued to leather or of thick pasteboard. One splint, broad enough to cover half of the thigh, should reach from the top of the hip-joint to a little below the knee, and another, covering about a third part of the thigh, from the groin to a little below the knee. The splints should be lined with flannel. They are to be secured by a twelve-tailed bandage, and over all a thin pillow should be put nearly as long as the thigh. The splints and bandages may be put on in the following manner: the patient being placed on a firm hair mattress, with his knee moderately bent, the long splint bandage and pillow are to be applied to the outside of the thigh, and the patient should be turned somewhat towards the affected side, with the knee and leg raised a little higher than the body: the short splint should then be applied along the inside of the thigh, and the bandage already placed without the other splint, applied so tight as to make an equal moderate pressure over the whole. To make the part still more secure, it is proper to insert a long firm splint of timber under the middle of the pillow, and to fix it by two broad straps to the upper part of the limb. To prevent the limb from being affected by involuntary startings, the pillow should be fixed to the bed by straps: to keep off the weight of the bed-clothes, a frame with hoops should be placed over the thigh. The parts should be examined after some time, to see that the bones be not displaced. When there is pain, swelling, and inflammation, leeches and other remedies should be applied. To render the situation of the patient as easy as possible during the cure, he may be allowed after the second week to turn a little more towards his back, and at the same time to extend the joint of the knee in a small degree: after this time a little flexion and extension of the limb may be daily repeated to preserve the use of the joint.

The method here described generally succeeds. Sometimes, however, notwithstanding all our care, the ends of the bone slip over each other. To prevent the deformity which this occasions, it has been attempted to make extension and counter-extension by machines; but the pain and irritation have always been so great that little advantage has yet been derived from such means. The invention of the late Mr. Gooch of Norwich, improved by the late Dr. Aitken of Edinburgh, has been recommended as one of the best machines for oblique fractures of the thigh. After endeavouring to remove the pain, swelling, and inflammation, which are sometimes so great as to preclude the application of the simplest bandage, this machine may be tried. But if it be found impracticable to use it, the cure must be conducted in the usual way with the chance of the fractured pieces overlopping one another, and of course the limb being somewhat shortened.

The patella is most frequently fractured transversely, sometimes lengthwise, and sometimes into several pieces. Fractures of this bone have been said commonly to end in a stiff joint; but this is perhaps most frequently owing to the limb being kept too long in an extended posture. In the treatment of fractures of this bone, the leg should be extended to relax as much as possible the soft parts connected with the bone. The patient should be placed on a firm mattress, and a splint be placed under the limb long enough to reach from the top of the thigh to the under end of the leg, to which the limb should be fixed by a number of straps to keep it in a state of extension. The fractured bones are then to be brought together, and such a number of leeches applied to the joint as will remove as much blood as the patient can bear; and as long as much pain and tension continue, saturnine and other astringents are to be used for removing them. When this is accomplished, and the parts properly adjusted, a large pledget of Goulard's cerate should be laid over the joint, and a hooped frame employed to keep off the bed-clothes. In a longitudinal fracture the parts are easily kept together by a common uniting bandage or adhesive plaster; but in transverse fractures more force is necessary. Various bandages have been employed for drawing the pieces together in such fractures. We need not be anxious, however, about bringing the pieces very close together, as a cure may be made though they remain at a considerable distance. The bandages, unless particular symptoms occur, should not be removed till the end of the second week; after which the joint should be cautiously bent every second day to prevent stiffness.

The leg is commonly fractured near the lower end, this being the weakest part of the bones. In the treatment of a fractured leg the same rules apply which were given for a fractured thigh-bone. The muscles should be relaxed by bending the knee; but little advantage can be derived from bending the foot, for in proportion as the muscles behind are relaxed those before are put on the stretch: the patient may be therefore allowed to keep the foot in the easiest posture. The bones are commonly replaced by the gentle extension of the upper part of the limb by an assistant, while another supports it at the ankle. The bones being replaced, and the limb laid on its outside with the knee bent, two splints are to be applied, long enough to reach from the upper part of the knee to the edge of the sole, so as to prevent the motion both of the knee and ankle. The splints are to be retained by a twelve-tailed bandage, as in the case of fractured thigh-bone.

Fractures of the bones of the foot and toes are treated nearly in the same manner as fractures of the hand and fingers. Besides the splint which may be necessary for the particular part, a large one should be applied over the sole; nor should any motion be allowed for a considerable time either in the foot or ankle, otherwise the bones may be displaced, and a proper cure prevented.

SECTION VII. *Compound Fractures.*

By compound fracture is now generally meant a fracture of a bone communicating with an external wound in the integuments. They are much more dangerous than simple fractures; and most practitioners formerly considered amputation as indispensable in cases of compound fractures. M. Bilguer, surgeon-general to the armies of the late king of Prussia, was one of the first who affirmed that it is scarcely ever necessary. The best modern surgeons recommend never to amputate immediately in private practice, unless when the bones are so much shattered that they cannot re-unite, or the texture of the soft parts completely destroyed; because, even if amputation be at last necessary, the patient will have a greater chance of recovering than if it had been performed immediately after the accident: for the state of weakness to which he is generally reduced render the attendant symptoms less violent. On the other hand, it has been considered as no bad rule in the army or navy, where patients cannot be kept in a proper situation, and where sufficient attention cannot be given, to amputate immediately in cases of compound fractures of the large bones of the extremities. When amputation is not performed immediately, it is not, for several days at least, admissible. It may afterwards be rendered necessary by hemorrhagies, which cannot be stopped but by means more dangerous than amputation itself; by extensive mortification; or by the ends of the fractured bones remaining long disunited, while a great discharge of matter endangers the patient's life.

In treating compound fractures, all extraneous bodies should be removed, as also all those small pieces of bone which will probably not unite with the rest. For this purpose the opening, if necessary, should be enlarged with a scalpel. The next step is to replace the bones by relaxing the muscles as in simple fractures. Sometimes part of a bone projects so far through the integuments that it cannot be replaced without either sawing off the end of it, or enlarging the wound. If the fractured bone be long, sharp, and projecting much, it is best to saw it off; for though it were reduced, it would not readily re-unite, and it would be apt to excite much pain and inflammation: but if it be broad at the base, and of no great length, it ought not certainly to be sawed, even though it cannot be reduced without enlarging the wound. For the most part, it is only the skin which it is necessary to cut; but even the muscles ought to be divided, though as much as possible in the direction of their fibres, when the bone cannot otherwise be replaced. After the reduction, a pledget of some emollient ointment is to be laid over the wound, and the limb placed on a firm splint, and still kept in a relaxed posture. In dressing the wound, the limb ought not to be moved: the many-tailed bandage, therefore, should be used rather than a roller. Various contrivances have been fallen upon to allow the limb to be at rest while the surgeon is dressing it, but the common splints, with a pillow underneath, and such a suspension of the bed-clothes as may prevent their touching the limb, is all that is necessary.

It is of the greatest importance to prevent inflammation, which is apt either to produce mortification, or to give rise to extensive abscesses. The dressings should be removed once or twice daily, according to the quantity of matter. The common application of warm poultices, on account of their inconvenience, may be deferred till they become necessary by the approach of inflammation, which they are to be considered as the surest means of preventing by exciting a discharge of matter. Whenever the inflammation subsides, and a free discharge of pus is produced, the poultices ought to be laid aside, lest they do harm by relaxing the parts too much, and exciting too copious a discharge. The sore ought then to be dressed with mild astringents, and the patient kept on a nourishing diet with tonic medicines. A free passage should be given to the matter by putting the limb in a favourable posture, and by making a counter-opening, if necessary, to the most depending part. But this may be frequently avoided, by covering the sore with soft lint or sponge to absorb the matter. If the discharge become excessive, and cannot be lessened by the means above-mentioned, it will be found to proceed from a portion of loose bone which has not been earlier noticed, by the removal of which it may be stopt. If, instead of producing matter, the inflammation terminate in gangrene, the danger is still greater than under the most extensive abscesses. For the treatment of this, the reader is referred to Part II, Division I, Chapter I, Section II.

CHAPTER III. *Amputation.*

SECTION I. *Amputation in general.*

In amputation, which, in surgery, signifies cutting off a limb, the great end to be aimed at is, the procuring of a handsome stump, in which the bone may not protrude, but be well covered with flesh; so that no excoriation or rawness may be apt to take place. As long ago as the year 1679, it was proposed by Jacob Young, an English surgeon, in a treatise entitled Currus Triumphalis ex Terebinthino, to preserve a flap of flesh and skin, which was to be folded over the bone, and which, uniting to the parts of the wound after amputation, would effectually cover the bone, and prevent the inconveniences above-mentioned. No traces of the advantage of this method, however, can be found till the year 1696; when a Latin dissertation was published upon it by P. Adrians Verduin, an eminent surgeon in Amsterdam. The most sanguine expectations were formed of its success; and it was even thought that the flap would prevent the necessity of tying up the blood-vessels. However, it does not appear that the method as at that time practised either did or could succeed, and accordingly it was entirely laid aside; but it has been lately revived with considerable improvements.

Amputation may be rendered necessary when a member is so much diseased as to be useless, or when it puts life in danger.

The causes in general rendering this operation necessary are, bad compound fractures; extensive lacerated and contused wounds; part of the limb being carried off by a cannon ball or otherwise; the bones being unequally broken and not properly covered; extensive mortification; white swellings of the joints; large exostoses; ulcers attended with extensive caries; cancer or other incurable ulcers; varicose kinds of tumors; particularly distortions of the bones.

Amputation may also be sometimes necessary from violent hæmorrhagies of some principal artery during the cure of a fractured limb, or from such a profuse discharge of matter taking place that the strength of the patient is exhausted. Lacerated and contused wounds may require amputation, on account of hæmorrhagy ensuing which cannot be stopped. Extensive mortification may take place, and such large quantities of matter be formed, that the patient will be unable to bear up under the discharge.

Where part of the limb is carried off, it is necessary to amputate higher up, so as to cut the bone, as well as the soft parts, in such a manner as may admit of a much speedier and safer cure. When mortification occurs, every thing ought to be done for the support of the patient till this symptom be stopped; the first sign of which is, the appearance of an inflamed circle between the diseased and sound parts. As soon as the diseased begin to separate from the sound parts, amputation of the limb ought to be performed, and no time ought now to be lost, lest the patient suffer from the absorption of putrescent matter.

No part of surgery is brought to greater perfection than the manner of performing amputation. Before the invention of the tourniquet, and the method of securing the vessels by ligature, the operation was seldom undertaken; and a great proportion of those, upon whom it was performed, died soon after. In the present improved method, one death does not happen in twenty, or even thirty cases. In performing the operation, particular attention is to be paid to the spot where the incision is to be made; the quantity of skin and cellular substance necessary to be saved, so as to cover the muscles and bone completely, without being stretched; cutting the muscles in such a manner that they may unite with each other and entirely cover the end of the bone; the prevention of hæmorrhages during the operation; the tying of the arteries alone, without including the nerves or any of the contiguous parts; securing the integuments so as to prevent them from retracting after the operation; and a proper subsequent treatment of the case.

The following are the general steps of the operation: The patient being properly placed, with assistants to attend, and the apparatus in proper order, the flow of the blood to the limb is to be stopped by the tourniquet. The first incision is to be made through the skin and cellular substance by one or two circular strokes of the amputating knife. These are next to be separated from the muscles, as far as may appear sufficient for covering the stump. The separated skin or flap should be strongly drawn up, or what perhaps answers better, turned up all round the limb, leaving this part of the muscles quite bare. The flap is to be kept in this situation by an assistant, while the operator makes the next incision at the edge of the reflected skin, and cuts till he comes to the bone. This incision should be begun on the lower side of the limb, that the blood may not prevent the eye from readily following the edge of the knife during the whole cut. The muscles are now to be separated from the bone as high as may enable them afterwards completely to cover it. The soft parts in general are then to be drawn up by retractors, which may be either of leather or metal. The periosteum is to be divided at the place where the saw is to be applied; but no part of the bone is to be denuded of this membrane, which is afterwards to cover the stump, otherwise troublesome exfoliations may ensue. At this place the saw is to be applied, and the bone divided with long steady strokes. In this part of the operation a good deal depends upon the steadiness of the assistant who holds the limb; for, if it be held too high, the motion of the saw will be impeded; while the bone may be splintered if it be not sufficiently raised. Any points or splinters which may be left should be immediately removed with the pincers. The retractors are now to be laid aside, and the principal arteries separated from the nerves, and secured by the tenaculum, or forceps, and ligatures.

The tourniquet should next be a little slackened, to allow the different branches to be discovered. The clotted blood is to be cleared away with a warm sponge. The patient should get some warm cordial drink, and all the arterial branches, which can be discovered, ought to be taken up. The ends of the ligatures are then to be cut of such a length as to allow them to hang without the lips of the wound. The muscles and skin are now to be drawn down and brought into close contact, that the stump may be completely covered. The parts are next to be secured by proper bandaging; and, if the operation has been properly performed, the cure will commonly be made by the first intention, and may be completed in the course of three or four weeks, and sometimes in a shorter period. This, however, must depend much upon the constitution of the patient, as well as the manner of performing the operation.

Section II. *Amputation of the Arm and Fore-arm.*

Amputation of the arm is performed according to the rules already laid down. No more of it should be removed than is diseased; for the longer the stump is, the more useful it proves. The tourniquet is to be applied a little above the part where the operation is to be performed: as much of the integuments should be saved as may be perfectly sufficient for covering the sore. In taking up the artery, after the bone has been divided, the operator ought to be attentive not to include the radial nerve, which may be readily discovered and separated, as it lies close upon the fore part of the artery. The fore-arm is to be amputated nearly in the same manner as the leg; only that the stump may be covered by amputating with the double incision, without the assistance of a flap, which it is necessary to form in the leg.

Section III. *Amputation of the Thigh.*

In performing this operation, the patient ought to be placed upon a table of ordinary height, with the diseased limb supported and secured by an assistant seated before him, while other assistants take care of the other leg and the arms. The course of the blood is to be stopped by applying the tourniquet over the trunk of the femoral artery, near the upper part of the thigh. No more of the thigh ought to be removed than is rendered necessary by the disease, as the more of it is left, the more useful it will be to the patient. An assistant should grasp the limb with both hands a little above the place where the skin is to be divided, and draw it up as far as possible; while the operator, standing on the outside of the limb, makes a circular incision down to the muscles by one or two strokes of the knife. As much of the integuments is then to be dissected with a scalpel from the muscles as may cover the stump completely; and this part of the skin may either be turned back, or drawn tightly up by an assistant. The muscles may then be divided quite across to the bone by the edge of the skin, in the common way, or cut obliquely upwards, according to the method of Allanson, so as to lay the bone bare two or three fingers-breadth higher than is done in the common way. The muscles are next to be separated from the bone with a scalpel a little way, that a sufficient quantity may be left for covering the end of it. The rest of the operation is to be performed exactly according to the general rules laid down in the first section of this chapter. The muscles and integuments are to be drawn over the end of the bone, and applied closely together, that the skin may completely cover the stump, and retained in this situation by an assistant till a flannel or cotton roller, according to the season of the year, which has been previously fixed round the body, be applied in such a manner as to support and fix them. For which purpose it should be passed two or three times, in a circular direction, round the top of the thigh, and should afterwards, with spiral turns, be brought down near to the end of the stump and fastened with pins; and it should not be tighter than may be sufficient to assist the plasters in preventing retraction.

The ends of the divided muscles are now to be laid exactly over the bone; and the edges of the skin are to be brought into contact, either so as to form a straight longitudinal line, according to the method of Mr. B. Bell, &c.; or they are to be placed horizontally, "that the wound may appear only in a line with the angles at each side," as advised by Allanson. The ligatures may either hang over the edges of the wound, or be brought to the angles. After the edges of the skin are in this manner exactly applied to each other, either a few slips of adhesive plaster are to be laid across the face of the stump, or two large pieces of adhesive plaster, with several pieces of tape fixed to them, are to be applied to the surface of the skin. The tapes are then to be tied with a running knot immediately over the wound; by which the parts will be kept so closely together as to prevent any collection of matter from being formed. The whole surface of the stump should next be covered with a large pledget spread with an emollient ointment, over which a compress of fine tow is to be put, and retained in its place by a broad cross strap of old linen, passing some way up the thigh, so as to be secured by the roller, which is now to be passed two or three times round the stump; and the pressure formed by the cross strap may afterwards be increased or diminished at pleasure, by drawing it with more or less tightness, and fixing it with pins to the roller. While the stump is dressing, the tourniquet is removed, but replaced again loosely to enable the attendants to check any hæmmorrhagy which may afterwards ensue.

The patient is now to be laid to rest, and the limb is to be placed upon a little tow covered with linen, or upon a thin soft pillow; and to prevent the patient from involuntarily moving the limb, and to guard against spasmodic startings, which frequently happen after this operation, it may be fixed to the bed by two straps. A basket or hooped frame ought to be placed over the stump to protect it from the bed-clothes. The patient should immediately get an anodyne draught, which will generally procure ease through the rest of the day. For this purpose, no more light should be let into the room than is merely necessary for allowing the attendants to pay attention to the stump. As hæmorrhages sometimes appear several hours after the operation, the person who takes the charge of the patient should watch this circumstance with the greatest attention. If there be only a slight oozing of blood, there is no occasion for being alarmed; but whenever it appears to proceed from a large artery, it must be secured. The spasmodic affections which frequently occur after amputation are seldom troublesome, unless some nerve has been included in securing the arteries; but when they do appear, laying the limb in the easiest posture, and giving opiates, are the principal means of procuring relief.

To prevent inflammation as much as possible, the patient is to be kept upon a strict antiphlogistic regimen, and his bowels kept open by laxative clysters, till the inflammatory stage is over, which will generally be in a few days. If, notwithstanding this treatment, the stump swells, and the patient complain of pain and tightness, we ought to endeavour to discover from what cause the uneasiness originates. If it be owing to the straps being too tightly fixed, they must be slackened. If the stump be found much swelled, a saturnine solution should be applied by means of several folds of linen; and if the patient be young and plethoric, he ought to lose a few ounces of blood from the arm; but if he is weak and emaciated, a different mode of treatment must be followed.

At the end of the third, or fourth day at farthest, the stump should be examined; and if it appear somewhat open and flaccid, the parts must be brought closer together and secured more firmly. After this time the dressings should be renewed every day, or every second day. In about a week after the operation the ligatures may generally be removed with ease; but if they do not separate readily, they may be gently pulled at every dressing, when they will, in a short time, be brought away, and the wound will be soon healed by the first intention. The roller should be cleaned and renewed as often as it is found sullied; nor should it be laid entirely aside till the end of the third or fourth week after the operation. When the roller is removed, we may depend upon the straps or tapes for keeping the parts together till the cure be quite accomplished. When the inflammatory symptoms are entirely gone, no medicines ought to be given which would debilitate the patient, nor is any thing more necessary than to keep the bowels gently open till a complete cure be made.

SECTION IV. *Amputation of the Leg.*

The leg may be amputated for a disease in the foot at two different parts; the one a handbreadth under the knee, the other a little above the ankle. The former makes a sufficient support for the body to rest upon an artificial leg; but the latter does that equally well, and likewise preserves the motions of the knee.

In performing the operation a little way under the knee, the patient is to be placed and secured in the same manner as in operating upon the thigh. The tourniquet is to be placed a little above the knee, with the cushion upon the artery in the ham. The surgeon places himself upon the inside of the leg, and makes a circular incision through the integuments down to the muscles. The place where the incision should be made must depend upon the length of the limb; but in general it may be between six and seven inches under the top of the tibia in an adult, or far enough down upon the limb to save as much integuments as will cover the stump. After the integuments are cut through in the manner already directed, as much of the muscles are to be divided by the knife as can be done by a circular incision; and the interosseous parts are to be divided by a scalpel or catline. The retractors are then to be applied, and the bone sawed off immediately below the insertion of the tendons of the flexor muscles. In sawing, the operator ought to begin upon both bones at the same time, that he may finish upon the tibia, lest splinters should be formed. The vessels are next to be secured; the soft parts drawn over the bones; the adhesive plasters and other bandages applied in the same manner as directed for amputating the thigh, only that here the roller need not be applied so high as in the former operation. Two or three turns above the knee, however, are necessary to prevent the dressings from slipping down.

In amputating upon the ankle, the operator should fix upon that spot which will leave the stump of such a length as may be most convenient for being fitted with an artificial machine resembling the other leg. Nine inches from the joint of the knee, in a leg of ordinary length, was found by Mr. Wilson, a late ingenious artificial limb-maker in Edinburgh, to be the best part suited to this purpose, on account of the equal pressure it makes upon the surface of the leg, without making any upon the end of the tender stump. The operation is performed in the same manner as that a little below the knee.

Section V. *Amputation at the Joints of the Extremities.*

The circumstances most to be attended to in performing amputation at the joints are, first to stop the circulation by the tourniquet; or, where that is impracticable, to take up the trunk of the artery by a ligature; to make a circular incision in such a place as may, after the operation is over, be sufficient to cover the wound; then a longitudinal incision is to be made upon the opposite sides of the limb, extending from the joint to the circular cut, and as deep as the bone, by which two flaps will be formed to cover that part of the joint which remains after the operation is finished. The ligaments of the joint are next to be divided, and the affected limb or part of the limb removed.

After this part of the operation, it was formerly a frequent practice to scrape off the remaining cartilage, to unite the parts more firmly together. But this is now found to be unnecessary; for when the flesh is applied properly to the bone, if it do not grow to it, the union at least is so close that it afterwards gives no inconvenience to the patient.

Any branches of arteries which may have been cut during the operation are now to be secured; clotted blood is to be removed; and the muscles and skin are to be brought into close contact with the ends of the ligatures hanging out of the wound. The parts are to be retained by adhesive plasters, or twisted suture, or both; and proper bandages applied in such a way that a cure may be made by the first intention.

Amputating the arm at the shoulder-joint has always been considered as a dangerous as well as a difficult operation. It should never be attempted, when the same purpose can be accomplished by operating lower down. But cases occasionally occur, where the life of the patient cannot, in any other manner, be saved.

Amputation may become necessary here in consequence of abscesses of the joint; caries of the humerus reaching to the joint; compound fractures, especially those from gun-shot wounds, extending to the head of the bone; and of mortification.

In performing the operation, the patient should be laid upon a table of convenient height, covered with a mattress. He is then to be brought as near to the edge of it as possible, and secured by assistants. The circulation of the blood in the arm is next to be stopped, by an assistant pressing strongly with a firm compress over the subclavian artery, where it passes over the first rib; or an incision may be made along the course of the artery, which may be secured after separating from it the contiguous nerves. When the artery is compressed, it will readily be known whether the compression proves effectual, by observing when the pulse at the wrist is entirely stopped. As soon as this is the case, a circular incision is to be made through the integuments at the insertion of the deltoid muscle into the humerus. An assistant then draws the skin a little back, and at the edge of the retracted skin the muscles are to be cut in a circular direction to the bone.

If the artery has not been taken up at the beginning of the operation, it is now to be secured, as well as any branches which come in the way.

The amputation-knife is now to be laid aside, and the rest of the operation finished with a strong scalpel. A perpendicular incision is next to be made at a little distance from the outside of the artery, beginning at the acromion, and terminating in the circular incision, cutting as deep as the surface of the bone. A similar incision is to be made upon the back part of the arm, so that the flaps may be nearly of an equal breadth. The arterial branches are here to be secured; the flaps are to be separated from the bone, guarding against wounding the trunk of the artery; the flaps are to be supported by an assistant; and the capsular ligament of the joint is to be cut from the scapula: and thus the arm will be entirely separated.

After the arm has been separated, any arteries which appear about the joint are to be tied, and all the ligatures brought over the edges of the wound. The parts are to be cleared of clotted blood, and the two flaps drawn over the wound, and secured by the twisted suture. A pledget of any emollient should then be applied, and a sufficient cushion of lint, with a compress of old linen, put over the whole. A moderate pressure is next to be applied by a flannel roller: by which the parts will be supported, their union facilitated, and matter most likely prevented from being lodged. The treatment is then the same with that after amputation in other parts of the extremities. For two or three days after the operation, it is necessary that an assistant sit with the patient to compress the artery in case a bleeding should ensue.

When it is necessary to amputate the whole hand, the operation may be performed at the wrist, so as to leave as much of the member as possible; and the same rules hold here as in amputating at any of the rest of the joints. The tourniquet is to be applied to the artery in the arm, and the cure is to be completed by the first intention. When any of the carpal bones are affected, the sore will not heal till they either work out by suppuration, or are cut out by the knife. When the middle of any of the metacarpal bones is diseased, while their extremities are sound, the trepan may be applied, and the diseased parts removed, while the remaining sound parts are preserved. But if the whole bodies of one or two of these bones be affected, while the rest remain sound, all the affected bones ought to be removed. In performing the operation, an incision is to be made along the course of the part affected; and if the operator have it in his choice, the incision should be made upon the back part, so as to save the great vessels and nerves situated in the palm. The integuments are then to be dissected, and turned to each side; after which the diseased bones or parts of bones are to be removed, guarding as much as possible against wounding the principal arteries or nerves which lie near them.

The diseased parts are next to be separated; any arteries which happen to be cut are to be secured; and, on account of the free communication which they have with neighbouring branches, they ought to be tied at both cut ends. If, after this, a bleeding still continue, compress, styptics, and other remedies proper for stopping blood, are immediately to be used. The sides of the wound are to be brought together, and an attempt made to cure them by the first intention.

In amputating the fingers, it was formerly the practice to operate upon the bodies of the bones in the same manner as in the larger extremities; but at present the removal at the joints is more frequently practised.

In performing the operation, it is necessary to save as much skin as may cover the stump, and this ought to be done upon the side next the palm, so as to guard against the effects of friction. The general steps of the operation are the same with those for amputation of the larger joints.

A circular incision is to be made on the finger by a crooked bistoury, about the middle of the phalanx, and it may be carried at once to the bone. Another incision is to be made with a common scalpel at each side of the finger, beginning at the circular one and continuing it to the joint, by which two flaps will be left to cover the stump. The ligaments of the joint are now to be divided, and the bone removed. The blood-vessels are to be secured by ligature, and the flaps exactly applied to each other; but in order to protect the end of the bone completely, a small portion may be cut from the uppermost flap. The flaps are to be retained by adhesive plaster, or by the twisted suture; but if the latter be used, the tendons ought to be avoided. Over the sore an emollient pledget is to be applied, and then a compress and roller. If the disease be so situated, that instead of amputating at the cavity of the joint, the surgeon shall think proper to operate upon the body of the bone, flaps are to be formed as above, and the bone is to be divided by means of a small spring saw.

The amputation of the thigh, at the hip-joint, has always been considered as one of the most formidable operations in surgery; so much so, that very few cases appear on record of its having ever been put in practice. In the Medical Commentaries of Edinburgh, an instance is recorded where the thigh was amputated at this joint, and where the patient survived the operation eighteen days, and then died from a different cause, when all risk of hæmorrhagy was over, and when the sore had even a favourable appearance, which shews at least that the operation has been done with safety. It certainly ought never to be done, however, unless as the last resource, and when the life of the patient is in absolute danger; and then only when as much skin and muscles can be saved as will cover the sore, and when there is also a probability of being able to stop the hæmorrhagy, and prevent it from returning.

When the operation is to be performed, the patient is to be laid upon his back on a table, and properly secured by assistants; one of whom should be ready with a firm cushion to press, if necessary, upon the top of the femoral artery, just after it passes from behind Poupart's ligament to the thigh. A longitudinal incision is now to be made through the skin, beginning immediately under the ligament, and continuing it downwards along the course of the artery for about six or seven inches. The aponeurosis of the thigh is then to be divided by gentle scratches till a furrowed probe can be introduced, when the opening is to be dilated by means of a scalpel, till two or three inches of the artery be laid bare. A strong ligature is now to be put under the artery by the assistance of a curved blunt-pointed needle.

The part where the ligature should be passed is immediately above the origin of the arteria profunda; for if that artery be not affected by the ligature, the patient might suffer by the loss of blood during the rest of the operation. The ligature is now to be secured by a running-knot: another ligature is to be introduced a little below the former, and likewise secured; the artery is then to be divided between the ligatures. A circular incision is now to be made through the integuments of the thigh, about six inches from its upper end. The retracted skin is then to be pulled at least an inch upwards, and at the edges of it the amputating knife is to be applied, so as to cut the muscles down to the bone. This being done, a cut is to be made upon the posterior part of the thigh, beginning a little higher than the great trochanter, and continuing it down to the circular incision, and as deep as the joint. A similar cut is to be made on the anterior part of the thigh, at a small distance from the artery, and this reaching likewise down to the bone. The two muscular flaps are to be separated from the bone and joint, and held back by an assistant. Every artery which appears is now to be secured. Then the capsular ligament, and next the round one, are to be separated from the acetabulum; by which means the limb will be removed from the body. The acetabulum and neighbouring bone are next to be examined; and if they appear sound, the case will be more favourable; but at any rate, a cure is to be attempted by the first intention. For which purpose, after removing all the clotted blood from the surface of the wound, and bringing the ligatures over the edges of the skin, the muscles are to be placed as nearly as possible in their natural situation; and drawing the flaps together, so as to cover the wound in the most accurate manner, they are to be kept in this situation by adhesive plaster, and by the twisted suture and other dressings, as in amputating at the under part of the thigh. The dressings are to be retained by a broad flannel roller passed three or four times round the body, and spirally over the stump, and secured. The patient is then to be laid in bed on the sound side, and treated as for amputation in other parts of the body; only that greater attention is necessary, as there is no assistance from a tourniquet. Uncommon attention will also be necessary to prevent inflammation, and every symptom of fever which may succeed to the operation.

When the foot is so much diseased as to require amputation, the operation might be performed at the point of the ankle; but for the reasons given, when treating of amputation of the leg, it is found better to do it above the ankle. When a considerable part remains sound, it ought to be saved. If any of the tarsal bones are affected, these are to be removed. When the middle or whole body of any of the metatarsal bones are diseased, they are to be removed in the same manner as directed for similar operations in bones of the hand; and if even two of them remain sound, provided they be so placed as to support the toes, they ought to be preserved, as it is known that, by proper treatment, an osseous matter may afterwards fill a considerable part, if not the whole, of the void; or if any cavity remain, it may be so stuffed, that the use of the foot may still be enjoyed.

In performing an operation of this kind, the patient should be laid upon a table, and the tourniquet applied in the ham to prevent hæmorrhagy. An incision is then to be made along the affected part; and if the seat of the disease admit it, the incision should be made upon the upper side of the foot so as to save the sole. The integuments are to be separated and turned to each side, to allow the affected parts to be completely removed.

The principal vessels and nerves are to be saved as much as possible; but if any particular artery be cut, it is to be secured, and the part treated as after the removal of similar parts of the hand.

The amputation of the toes is exactly similar to that of the fingers.

SECTION VI. *Removal of the Ends of Carious Bones in the Joints.*

In compound fractures, the ends of bones, when they protruded in such a manner that they could not otherwise be returned, have frequently been sawed through, and their place has frequently been supplied by a renewal of bone, so as to preserve the ordinary use of the limb. Many cases have likewise happened, where a large part of the body of the bone has been thrown out by suppuration, and its place supplied; and a few are upon record, where either the whole of a bone, or that end next the joint, has been thrown out, and its place filled up with callus, so that no inconvenience has been felt. From these circumstances, Mr. White of Manchester was led to preserve an arm by sawing off the head of a diseased humerus; and Mr. Park of Liverpool, to save a limb, by sawing off the ends of the bones, in a case of white swelling of the knee. When, therefore, it happens that the end of a bone is diseased, while the other parts are sound, the diseased part may be removed, and the sound one saved, so as, in a great measure, to preserve the free use of the limb.

In performing the operation, the first step should be to use such means as may enable the operator to have a full management of the circulation of the part affected. Then a longitudinal incision of sufficient length, and perhaps another across it, may be necessary to be made through the soft parts of the joint; and this opening ought to be at a distance from the large bloodvessels, that they may be in no danger of being injured. After the end of the diseased bone is sufficiently laid bare, it is either to be brought out of the joint, or a spatula or some other proper substance is to be introduced between the bone and soft parts, so as to defend the latter in time of sawing the bone. After the diseased part of the bone is removed, the arterial branches are to be secured, and the wound treated like any other wound of equal size.

During the cure, the limb ought to be kept in the posture most favourable for the removal of the bone, and afterwards for the preservation of the natural motion of the joint.

In this way a limb may sometimes be saved, which would otherwise have been removed. But, though the removal of the diseased end of one bone may be readily effected, the removal of all that part of the bones which enters into the composition of a joint must be attended with so much inconvenience, that it can seldom be useful, unless it be where the ends of bones are destroyed by external violence; for then it appears that this operation may be performed with considerable success.

CHAPTER IV. *Bandages.*

The proper application of bandages is an object of great importance in surgery: and, though dexterity is only to be acquired in this branch by practice, yet a few general rules may be found useful. Bandages are employed for the retention of dressings, for stopping hæmorrhages, for removing deformities, and for effecting the union of divided parts. They ought to be formed of such materials as are sufficiently firm, while, at the same time, they give no uneasiness to the parts to which they are applied. They may be composed either of linen, cotton, or flannel. Of late years the two last have been preferred by many for their warmth and elasticity, on which account they are certainly most proper, especially in winter; and likewise in cases where the parts are liable to swelling and inflammation, as in wounds, luxations, and fractures. Besides, they more readily absorb any moisture, which may be discharged from the sores.

When first applied, they should be clean, sufficiently strong, and as free of seams as possible. They should be so tightly applied as to answer the purpose for which they are intended, without being in danger of impeding the circulation. They should be applied in such a manner that they may be easily loosened, and the parts examined with as much accuracy as possible; and they should be laid aside as soon as the purpose for which they are intended is accomplished; for when longer continued, they frequently impede the growth of the parts upon which they are applied.

With respect to bandages for particular parts, we shall begin with the head, and then proceed to the trunk and extremities. The *couvre chef* of the French, which is a square napkin folded cornerwise, is most frequently used where a bandage is wanted for the head; but a nightcap, having a band to go round the head, and another to tie under the chin, appears to be more suitable for this purpose. For making compression on any particular part of the head, as for stopping of bleeding vessels, the radiated bandage may be employed.

For keeping the edges of wounds together, as

In cases of longitudinal cuts of the head, or of any other parts, the uniting bandage is usually employed, and is always to be preferred to sutures, where it retains the edges of the wound with sufficient exactness. For retaining dressings upon the eyes, several turns of a roller have been used, and it is termed monoculus, or binoculus, according to its being applied to one or both eyes; but the *couvre chef*, and the nightcap already mentioned, are less apt to slip, and therefore found more convenient for this purpose.

For fractures of the nose, or wounds there, or on any other part of the face, the uniting bandage answers best. And in cases of fracture of the lower jaw, a four-headed roller is most convenient: the hole in the centre of the roller receives the chin, and assists in preventing the bandage from shifting. The two upper heads are to be carried backwards; and being made to pass each other at the occiput, they are afterwards brought once or twice round the head. The two under heads of the roller being reflected over the chin, are then to be turned upwards and fixed on the upper part of the head.

The bandages necessary for the neck are those usually employed after the operation of bronchotomy, and one used in cases of wry neck. For every other purpose of bandaging a common roller may answer perfectly well.

For fractures of the scapula, the application of a long roller may be of service.

For retaining dressings upon the thorax, the napkin and scapulary are commonly, and very properly used; and when the napkin is employed merely for retaining dressings, it need not be longer than to pass once round the body; but if it be used for making pressure over a fractured rib, it ought to pass two or three times round. For both purposes its breadth ought to be six or seven inches for an adult.

The same kind of bandages is also used for making pressure on the abdomen, as in cases of umbilical or ventral hernia; and to keep the bandage properly placed, a scapulary is used for preventing it from slipping down, and one or two straps connected with it behind are brought between the thighs, and fixed to it before to prevent it from moving up. A bandage of flannel, and different kinds of belts, are contrived for compressing the abdomen in the operation of tapping; and trusses of various constructions are used for the retention of the protruded bowels in cases of hernia.

Bandages of cotton or flannel are used for supporting the scrotum in the various diseases which may occur there, as well as after the operations performed upon it.

One of the best bandages for the penis is a linen or cotton bag, fixed by a roller round the body.

For retaining dressings about the anus, or between that part and the scrotum, the T bandage is commonly used; and it is made either with one or two tails, according to the situation of the part to which it is to be applied.

In simple fractures, and most of the other diseases of the arm, fore-arm, and hand, the roller is the bandage commonly used; but in compound fractures of these parts, as well as in the different kinds of fractures of the lower extremities, the twelve or eighteen tailed bandage is necessary.

For longitudinal wounds of the extremities, the uniting bandage is used with the same advantage as has been already mentioned for wounds of a similar nature upon the head.

PART II.

We now advance to that portion of the art of surgery which more immediately comprises constitutional affections or diseases, properly so called, which, as in the preceding portion, we shall distribute into the two divisions of soft and hard parts.

Division I.

SOFT PARTS.

Chapter I. *Inflammation.*
——— II. *Tumours.*
——— III. *Aneurisms.*
——— IV. *Hernias.*
——— V. *Affections of the External Senses.*
——— VI. ——— *Neck, Thorax, and Abdomen.*
——— VII. ——— *Rectum and Anus.*
——— VIII. ——— *Urinary and Sexual Organs.*

Chapter I. *Inflammation.*

For the general theory and systematic division of this article, the reader must refer to Medicine, Class I. Order II. *Phlegmasiæ.*—If the topical inflammation, whatever be the organ on which it fall, be not discussed by the plan proposed for its resolution, it terminates in a division of continuity, and is followed by suppuration or gangrene.

Section I. *Suppuration.*

In the production of suppuration, the previous inflammation must only have extended to a certain range; and have been just so far excited as first to have stimulated the surrounding absorbents to carry off the dead and useless substance destroyed by the morbid attack, by which a cavity has been produced, which is denominated an abscess; and next to have stimulated the surrounding secernents to fill up the cavity by the secretion of a new material which is called pus.

In many cases nature will open the abscess and discharge the pus of her own accord; but in other cases she is incompetent, or we ought not to wait so long. Possibly we ought not, in such critical abscesses as occur in malignant fevers. In like manner, in the plague, we are commonly advised to open such tumours, so soon as they are at all tolerably advanced, and not to wait till they are fully maturated; as, from experience in these disorders, it is found to be of more consequence, for the removal of the original disease, to have a quick discharge of matter produced, than any harm the patient can ever suffer from having a swelling somewhat prematurely laid open.

In abscesses, also, situated on any of the joints, or upon either of the large cavities of the breast and abdomen, and more especially when they seem to run deep, they should always be opened as soon as the least fluctuation of matter is discovered. For, when the resistance is on every side equal, they just as readily point inwardly as outwardly: and the consequence of a large abscess bursting into either of the large cavities is well known most frequently to prove fatal: an instance of which, in the following case, with very little attention, might have been prevented.

A surgeon of eminence, and of very extensive practice, was applied to by a young healthy-looking man, with a large abscess upon the left side of his chest. A fluctuation of a fluid was, upon pressure, very evidently discovered; and it was agreed, by other two practitioners who were present, that an opening should be made to give vent to the matter. But the operator, being much engaged in business, could not fix on an earlier period for doing it than the third day from the patient's applying to him: unluckily, however, the patient died suddenly in his bed the night before the abscess was to have been opened. On examining the body, the tumour had disappeared entirely, without any external opening being observable; and, on opening the thorax, it was found to have burst inwardly upon the lungs, and produced immediate suffocation.

In every other circumstance, however, except in the cases alluded to, the rule in opening abscesses is, as was already remarked, to allow a thorough suppuration to take place, before any vent whatever be given to the matter; and it being then determined to lay the collection open, the next question that occurs, is with respect to the manner of doing it. There are three ways of opening an abscess so as to give an outlet to the matter; by caustic, by incision, or by the introduction of a seton.

1. The first is more agreeable to timid patients, who are afraid of the pain of incision, but is attended with some inconveniences which render the method of incision much preferable. Caustic acts slowly, and produces a long continued pain; besides, no kind of caustic has yet been invented, the effects of which can be confined to a certain determinate extent; hence the patient is liable to suffer much unnecessary pain, as the caustics commonly employed are either the lapis infernalis or lunar caustic. The abscess is to have a slip of adhesive plaster applied to it, with a slit cut in it of a size somewhat less than the opening is intended to be. This slit is to be filled with caustic reduced into a powder, and wetted to make it act more quickly. It is then to be covered over with a plaster, and the whole is secured with a firm compress and bandage. The time necessary for the caustic to make a sufficient opening will depend upon the thickness of the skin and strength of the caustic, but generally it requires several hours. When we find that an eschar is made, it is to be softened with any emollient ointment until it can be readily separated; after which, the matter is to be discharged, and the abscess treated as one opened by incision.

2. The method of opening abscesses by the knife is, to make an incision of such a size as to give free vent to the matter. The opening is to be made in the under part of the tumour, that the matter may pass readily out. It has been a practice among surgeons either to open a large abscess from end to end, or at least through two-thirds of its length; but from the bad consequences which often attend this method, the latest practitioners have thought it better merely to give a free discharge to the matter, without exposing the part to the action of the air.

3. The third method, viz. that by the seton, is now frequently employed. It has the advantage of being attended with little pain, emptying the abscess in a gradual manner, and completely preventing the access of the air, which, in the other two methods, is often attended with bad consequences; and it frequently performs a cure in a much shorter time.

There are various instruments for introducing the seton: it may even frequently be done by a lancet and common probe; but the instruments usually employed are a long sharp needle, or a needle probe. One of these being threaded with glover's soft silk, is to be introduced through the upper part of the tumour; but if the blunt probe be employed, it will be necessary to have the assistance of a lancet; the instrument is then to be brought out at the under part of the tumour, and in this way the matter will be allowed to run gradually off.

The usual mode of dressing an abscess the first time, is with dry lint. In the course of dressing, it will be proper to have regard to the situation of the abscess, and as much as possible to make the patient favour the discharge by his ordinary posture: and to this end also, the discharge must be assisted by compress and bandage: the compress may be made of soft old linen, applied according to the nature of the part and the season of the year. The frequency of dressing will depend on the quantity of discharge: once in twenty-four hours is ordinarily sufficient; but sometimes twice, or perhaps three times, is necessary.

Section II. *Gangrene.*

The other consequence of inflammation is gangrene, which may terminate in mortification. When the colour of an inflamed part changes to a dark red, when blisters arise on it containing an ichorous fluid, we know that it has become gangrenous. When it becomes black, flaccid, and insensible, when it loses heat, and acquires a putrid smell, it has proceeded to complete mortification. A gangrene seldom affects those who enjoy a good habit of body, though, even in them, it may be brought on accidentally by whatever destroys the texture of a part; as contusion, long continued pressure, or whatever deprives a part of its nourishment. In like manner, cold, by putting a stop to the circulation, may produce gangrene, and frequently does so in cold climates. This comes on suddenly, without any pain or previous inflammation; and the patient himself is frequently insensible of it, till he is informed of his situation by some other person.

A defect in the circulation, in extreme old age, frequently occasions mortification in the extremities.

There are some instances of what is called dry gangrene, in which the parts continue totally mortified for a great length of time, without either turning very flaccid, or running into dissolution. But such cases never occur from inflammation; they happen commonly from the flow of blood to such parts being put a stop to by compression of one kind or another, as tumours, ligatures, or other similar causes, obstructing the principal arteries which used to supply them; which, when the stoppage of the circulation is complete, always occasions a very slow, tedious mortification; and as the parts in such instances are no longer supplied with fresh quantities of fluids, while a considerable evaporation must still be going on, such a degree of humidity cannot therefore possibly occur, as does in other cases of gangrene. So that species of the disorder has, perhaps, with propriety enough, been termed the dry gangrene.

There is another variety of the disease termed white gangrene; in which the parts supposed mortified do not turn black, but retain nearly their former colour, &c. Whether such a complaint, however, can with propriety be denominated gangrene or not, may properly be doubted: but as it is chiefly that species of the disorder which succeeds inflammation that is here particularly treated of, and in which no such varieties are ever observed, it is not necessary to carry the inquiry farther.

The prognosis, in every case of gangrene, is doubtful at first, as, even in the slightest cases, the patient may suffer from the spreading of the disease; but slight cases, from external injuries, are more favourable than those which arise from internal causes, though no person can be considered safe till the diseased parts are separated, and even entirely cast off. When inflammation happens round a mortified part, more especially if pus be formed, we may pretty certainly pronounce that the mortified part will be thrown off.

When there is reason to suspect, from the violence of the fever, and great heat of the inflamed part, that it will terminate in gangrene, blood-letting, and whatever may have a tendency to moderate the inflammation, may check its progress. But as the patient, in such cases, is sometimes apt to sink afterwards, nothing more ought to be done than is merely necessary to moderate the present sypmtoms. If an inflamed surface put on a gangrenous appearance when the patient is weak, and the pulse low, we must have recourse to whatever may invigorate the system, viz. a nourishing diet, with the free use of wine. Peruvian bark likewise is to be given in as great quantities as the stomach of the patient will permit. When the stomach cannot bear enough in substance, which is the best form of exhibiting it, it may be given either in form of tincture, or joined with aromatics. External applications, such as are of a stimulating nature, may likewise be useful.

In the case of gangrene arising from cold, the part must be immersed in very cold water, or rubbed with snow; for if any thing warm be applied, or the patient brought near a fire, it certainly mortifies. If the whole body has become torpid with cold, the same practice must be followed; the very cold water should be afterwards changed for some that is a little warmer, and the patient gradually brought to a proper degree of heat. Rubbing with salt is sometimes found useful. If the whole body be benumbed, cordials are not to be administered too suddenly. A glass of cold wine should first be given, afterwards warm wine by itself, or with spices. If stronger cordials be required, ardent spirits may be employed. Notwithstanding the greatest attention, however, a mortification sometimes takes place, and in some instances very suddenly; as in the case of carbuncle, where, after an inflammation has continued for scarcely twenty-four hours, the parts become black, and end in real mortification.

In the treatment of mortified parts, a variety of external applications have been pointed out, and particularly those of the antiseptic kind; such as all the warm gums and balsams, ardent spirits, and even alcohol: and to admit of their nearer application to the sound parts, with a view to the preservation of these from putrefaction, deep scarifications through the diseased, and into the sound parts, have been generally recommended. But although such articles may be of use in preserving dead animal substances from corruption; yet, that they will always prove serviceable in the same manner in living bodies, is probably very much to be doubted. And it is even apprehended, by the strong irritation they always occasion when applied to a living fibre, that, in such cases as the present, they may rather do mischief; it being only a very slight degree of inflammation that is required to bring on a suppuration. The incisions, when carried into the sound parts, with a view to facilitate the operation of such remedies, may likewise do harm; not only from the risk of wounding the blood-vessels, nerves, and tendons, that lie in the way, but also by allowing a free and farther entrance of the putrescent fluids into the parts not yet affected: and unless they are carried so deep as freely to reach the sound parts, applications of the antiseptic kind can never have any effect in answering the purpose for which they were intended.

All the advantages commonly observed from the great variety of applications recommended for gangrene are obtained with more ease, and generally with more certainty, from the use of any gentle stimulating embrocation; which, by exciting a slight irritation upon the surface, and especially when assisted by a free use of the bark, at last commonly produces such a degree of inflammation as is wished for. With this view, a weak solution of sal ammoniac in vinegar and water has been known to answer exceedingly well: a dram of the salt to two ounces of vinegar and six of water, forms a mixture of a very proper strength for every purpose of this kind; but the degree of stimulus can be easily either increased or diminished, according to circumstances, by using a larger or smaller proportion of the salt.

Although, for the reasons formerly advanced, incisions may not in general be proper; yet in such cases where the mortification runs very deep, it is sometimes of service to make scarifications into the diseased parts, so as to remove part of them; which, by taking off a considerable load perhaps of putrid flesh, not only lessens the fetor, which, in such cases, is always considerable, but often renders it more easy for the sound parts to free themselves from the remainder. When with this view, however, incisions are had recourse to, care should always be taken that they be not carried the length of the sound parts.

When by the use of external or internal remedies, a separation of the mortified part has been effected, and a discharge of pus produced, the remaining sore is then to be considered merely as a simple purulent ulcer, and may be treated in the same manner.

Chapter II. *Tumours.*

This term has been very differently employed by different writers. Mr. Abernethy has lately used it to import a distinct order of diseases, which he arranges under the names of, 1. Sarcoma. 2. Encysted tumours. 3. Osseous tumours; or tumours composed of osseous matter, not communicating with any adjacent bone. We must, for the present, be allowed with Cullen, and other nosologists, to increase the number of genera by adding to the list ganglions, scrophulous tumours, and goitres.

Section I. *Sarcomatous Tumours.*

These by Mr. Abernethy are divided into the common vascular sarcoma, the adipose, or, as they have hitherto been called, steatomatous, pancreatic (from the resemblance of the new substance to this organ), mastoid, or mammary (from the same cause,) cystic, tuberculated, medullary, and carcinomatous, including scirrhus, and cancer.

For the most part these are to be removed by the knife; and the operation should be performed in their incipient state. Most of them may be removed with ease; but, restricted as we are to space, we must make a remark or two upon the last.

Cancer, in its approach, is peculiarly denominated scirrhus; there are many scirrhuses, however, that are not cancerous, and hence Mr. Abernethy distinguishes it by the name of carcinomatous scirrhus, as he does the ulcer that too often succeeds by that of carcinomatous ulcer.

No part of the body is more subject to cancer than the breasts of women. Cancer of the mamma may arise at any period of life, though it seldom appears till about the time the menses usually disappear. Tumours arising in the breast, previous to this period, have been considered by some practitioners as being only of a scrophulous nature; and it is probably owing to that circumstance that several cures have been of late years made on tumours of the breast by mercurial frictions and other remedies.

Scirrhus and cancer of the breasts are distinguished by the following marks: when the tumour is first observed, it is commonly in form of a small hard knot in the glandular part of the mamma, while the skin at the same time is free from inflammation. It frequently continues in this state for several months: by degrees, however, it increases considerably in size, and at last a sharp pain is felt shooting towards the axilla. The lymphatic glands at the under edge of the pectoral muscle and in the axilla are often enlarged, and an occult cancer is now formed. By degrees the integuments over this part of the tumour in the mamma become discoloured, and at last an ulceration or open cancer breaks out. Violent hæmorrhagies now frequently ensue; the pain becomes still more excruciating; and, unless proper assistance be given, the patient is generally cut off in not many months after the breaking out of the cancer.

In early stages, the disease in general may be considered as entirely a local affection, and a radical cure may be of course expected; but in proportion as the skin shall afterwards be found diseased, and adhering to the gland, and that to the pectoral muscle, and the lymphatic glands near the mamma and in the arm-pit swelled, the chance of a cure becomes more doubtful, as the cancerous matter becomes every day more likely to be absorbed, and part of it carried into the system, and in this case nothing remains but removal.

In general, however, before extirpation of a breast is recommended by the surgeon, or submitted to by the patient, a considerable portion of the external integuments are so much diseased as to render it necessary to separate them along with the glandular part of the mamma. It sometimes happens likewise that the tumour adheres to the pectoral muscle, and that again to the ribs. In either of these cases it becomes necessary to remove all the diseased parts. For this purpose, two incisions of an oval form, with sharp extremities, of a sufficient size to include the whole of the affected parts, become necessary. If again it be found, that besides the disease of the breast, the lymphatic glands in the neighbourhood are indurated, or otherwise diseased, the first incision ought to extend at once over these; and after the other parts have been removed, and the vessels secured, the whole of the diseased glands are to be extirpated; and in performing this part of the operation, considerable assistance may be given by supporting them with a hook, or a ligature passed through them, till they are entirely removed. When they lie deep in the axilla, the points of the fingers, or the end of the handle, will sometimes be safer than the edge of the knife. After having removed all the glands which are in the smallest degree affected, the cut edges of the skin are to be brought as near to each other as the nature of the case will allow, so as to heal as much as possible by the first intention. After the wound is nearly, or perhaps entirely healed, an issue, inserted into the arm of the opposite side, will be the best means of preventing a relapse.

Section II. *Scrophulous Tumours.*

We shall here only mention the surgical treatment of scrophulous tumours, having spoken of scrophula in general under the article Medicine. Some practitioners have recommended poultices, &c. to bring scrophulous tumours to suppuration; but the best practitioners have laid them aside, because they increase the soft and spongy state of the parts, by which they are prevented from healing.

As external applications are ineffectual, it is better to allow scrophulous tumours to be as much exposed as possible, as this frequently renders the subsequent ulcer more easily cured. The other methods recommended for discussing these tumours are, the internal use of cicuta, burnt sponge, muriated barytes, a long-continued use of the cold bath, particularly of sea-bathing, and drinking mineral or sea water. These, to produce any effect, should be begun early, while the tumours are small, and long persisted in. When the tumours come to a state of suppuration, if they are seated upon the thorax or abdomen, or any of the large joints, free vent ought always to be given to the matter to prevent its bursting into these cavities; and when the abscess is large, this should be done with a trocar, or by passing a cord through it, in order to exclude the external air. When the tumours are not situated upon great cavities, it is better to allow them to break of themselves, as the sores commonly heal more readily, and the scar is pretty similar in both. The most proper applications to scrophulous sores seem to be those of the saturnine kind, as they diminish inflammation, and in some measure prevent the sore from spreading. When the bones become carious, they are to be treated like carious bones from other causes; but amputation cannot here be attended with advantage, as the disease proceeds from a fault in the constitution. After the sores are healed up, the introduction of an issue may assist in preventing their return.

Tumours of a scrophulous nature are sometimes apt to be mistaken for those of the scirrhous kind, and thus may be improperly extirpated. Scrophulous tumours, deeply seated, commonly have a degree of firmness, which, if they happen to be seated near a suspicious part, as close by the side of a woman's breast, may give occasion to such a mistake. But they may generally be distinguished by the softness even of the firmest kind of them, when compared with scirrhus. They have always a smooth equal surface; whereas scirrhus is somewhat unequal or knotty, and seated in the real substance of the gland; and a shooting pain is commonly felt in it from time to time, even from its first appearance. They are generally accompanied, too, with other symptoms of scrophula, which is not necessarily the case with scirrhus.

Section III. *Of Bronchocele.*

This is a tumour on the fore-part of the neck, seated between the trachea and skin, termed in French *goitre*. In this country it is very rare; but it is frequent among the inhabitants of the Alps, and other mountainous countries, and is supposed to be owing to the use of snow-water. It is seated most frequently in the thyroid gland; though, in two cases examined by Mr. Benjamin Bell, this gland was diminished from the compression of the tumour, which was chiefly formed of condensed cellular substance, with effusions in different parts of it of a viscid brown matter. Dr. Prosser considers bronchocele as a dropsical affection of the thyroid gland; and in confirmation of this, he gives an account of a dissection of a diseased gland of this kind by Dr. Hunter, who found it, in a great variety of instances, filled with water. In reality, it is almost as variable in its consistency as any tumour whatever, and is sometimes fleshy, sometimes mellicerous, and sometimes watery. It has been occasionally confounded with cretinism; but Dr. Reeve has very clearly pointed out several distinctive characters. When the tumour is not very large, it has often been opened or extirpated with success: but there is some risk of a very troublesome ulcer, and perhaps of gangrene where it is very extensive. In this last case the writer of this article has, in many instances, known it break at length of its own accord, when filled with a fluid, and totally disperse without mischief; and the application of sea-water externally, or other solutions of muriat of soda; cataplasms of the fucus vesiculosus, or sea-wrack; solutions of ammonia, and similar stimuli applied externally, have generally been found more serviceable than the internal use of burnt sponge, hyoscyamus, conium, or any similar medicines.

Section IV. *Ganglions, or Swellings of the Bursæ Mucosæ.*

Ganglions of the tendons are likewise tumours of the encysted kind, seated in the bursæ mucosæ, or sheaths of the tendons which belong to the extremities. They are most frequently met with over the tendons upon the back of the wrist, and often likewise about those of the ankle and other parts of the extremities. When pressed, they are found to possess a considerable degree of elasticity, from which, and from their situation, they may generally be distinguished from other encysted tumours. They seldom arrive at any great bulk, are not often attended with pain, and commonly the skin retains its natural appearance. On being laid open, they are found to contain a tough, viscid, transparent fluid, resembling the glaire of an egg.

They are generally produced by sprains, or contusions of the joints, or by rheumatism. In many instances, they go off insensibly, without any assistance from art; but as this is often not the case, means ought to be used for removing them. For this purpose, moderate friction frequently repeated, or gentle compression applied to them by means of thin plates of lead, &c. sometimes remove them. In some instances they have been removed by the application of blisters; but the most certain method is, to make a small puncture into the sac, and to draw a cord through it; or, after the puncture is made, to press out the contents, and then inject some gently stimulating fluid, as port-wine and water heated blood-warm. Sometimes, in tumours of this kind, bodies of a cartilaginous nature, and of different shapes and sizes, are found; some quite smooth, others with peduncles, by which they are supposed by Dr. Monro, in his work upon the bursæ mucosæ, to have been attached to the bursæ. As these cannot be removed by any remedy with which we are yet acquainted, it is found necessary to discharge them. But as the parts may sometimes suffer from inflammation when the tumour is laid fully open, it may be punctured at each end; and, after pressing out the contents, a small cord may be introduced; after which gentle pressure may be applied with a compress and bandage over the course of the tumour. The cord, however, should not be continued so long as to induce any great degree of inflammation, for it is found that a slight degree of this sufficiently answers the purpose.

Chapter III. *Aneurisms.*

The term aneurism was originally meant to signify a tumour formed by the dilatation of the coats of an artery; but by modern practitioners it is made to apply not only to tumours of this kind, but to such as are formed by blood effused from arteries into the contiguous parts. There are three species; the true or encysted, the false or diffused, and the varicose aneurism.

The true or encysted aneurism, when situated near the surface of the body, produces a tumour at first small and circumscribed; the skin retains its natural appearance; when pressed by the fingers a pulsation is evidently distinguished; and with very little force the contents of the swelling may be made to disappear; but they immediately return upon removing the pressure. By degrees the swelling increases and becomes more prominent; but still the patient does not complain of pain: on pressure the tumour continues of an equal softness, and is compressible. After this the swelling becomes large, the skin turns paler than usual, and in more advanced stages œdematous: the pulse still continues; but parts of the tumour become firm from the coagulation of the contained blood, and yield little to pressure; at last the swelling increases in a gradual manner, and is attended with a great degree of pain. The skin turns livid, and has a gangrenous appearance. An oozing of bloody serum occurs from the integuments; and, if a real mortification do not take place, the skin cracks in different parts; and the artery being now deprived of the usual resistance, the blood bursts out with such force as to occasion the almost immediate death of the patient. Thus the disease terminates in the large cavities of the body; but in the extremities we can, by means of the tourniquet, prevent the sudden termination of the disease.

When affections of this kind happen in the larger arteries, the effects produced upon the neighbouring parts are often surprising; the soft parts not only yield to a great extent, but even the bones frequently undergo a great degree of derangement.

The false or diffused aneurism consists in a wound or rupture in an artery, producing, by the blood thrown out of it, a swelling in the contiguous parts. It is most frequently produced by a wound made directly into the artery.

The following is the usual progress of the disorder. A tumour, about the size of a horse-bean, generally rises at the orifice in the artery, soon after the discharge of the blood has been stopped by compression. At first it is soft, has a strong degree of pulsation, and yields a little to pressure, but cannot be made entirely to disappear; for here the blood forming the tumour, being at rest, begins to coagulate. If not improperly treated by much pressure, it generally remains nearly of the same size for several weeks. The enlargement, however, proceeds more rapidly in some cases than in others. Instances have occurred of the blood being diffused over the whole arm in the space of a few hours; while, on the contrary, swellings of this kind have been many months, nay, even years, in arriving at any considerable size.

As the tumour becomes larger, it does not, like the true aneurism, grow much more prominent, but rather spreads and diffuses itself into the surrounding parts. By degrees it acquires a firm consistence; and the pulsation, which was at first considerable, gradually diminishes, till it is sometimes scarcely perceptible. If the blood at first thrown out proceed from an artery deeply seated, the skin preserves its natural appearance till the disorder is far advanced: but when the blood gets at first into contact with the skin, the parts become instantly livid, indicating the approach of mortification; and a real sphacelus has sometimes been induced. The tumour at first produces little uneasiness; but as it increases in size, the patient complains of severe pain, stiffness, numbness, and immobility of the whole joint; and these symptoms continuing to augment, if the artery be large, and assistance not given, the teguments at last burst, and death must ensue.

When an artery is punctured through a vein, as in blood-letting at the arm, the blood generally rushes into the yielding cellular substance, and there spreads so as to shut the sides of the vein together. But in some instances where the artery happens to be in contact with the vein, the communication opened has been preserved; and the vein not being sufficiently strong for resisting the impulse of the artery, must consequently be dilated. This is a varicose aneurism. It was first accurately described by Dr. Hunter, and since that time has been frequently observed by different practitioners. Here the swelling is entirely confined to the veins. Soon after the injury the vein immediately communicating with the artery begins to swell, and enlarge gradually. If there be any considerable communications in the neighbourhood, the veins which form them are also enlarged. The tumour disappears upon pressure, the blood contained in it being chiefly pushed forwards in its course towards the heart; and when the tumour is large, there is a singular tremulous motion, attended with a perpetual hissing noise, as if air was passing into it through a small aperture.

If a ligature be applied upon the limb immediately below the swelling, tight enough to stop the pulse in the under part of the member, the swelling disappears by pressure, but returns immediately upon the pressure being removed. If, after the swelling is removed by pressure, the finger be placed upon the orifice in the artery, the veins remain perfectly flaccid till the pressure is taken off. If the trunk of the artery be compressed above the orifice so as effectually to stop the circulation, the tremulous motion and hissing immediately cease; and if the veins be now emptied by pressure, they remain so till the compression upon the artery be removed. If the vein be compressed a little above, as well as below the tumour, all the blood may generally, though not always, be pushed through the orifice into the artery; from whence it immediately returns on the pressure being discontinued.

When the disease has continued long, and the dilatation of the veins has become considerable, the trunk of the artery above the orifice generally becomes greatly enlarged, while that below becomes proportionably small; of consequence the pulse in the under part of the member is always more feeble than in the sound limb of the opposite side.

The causes producing aneurisms, in general, are a natural disease of the arteries. Thus a partial debility of their coats may readily produce the disease; or they may arise, especially in the internal parts of the body, from great bodily exertions. They are likewise produced by wounds of the coats of the arteries, as now and then happens in blood-letting at the arm; or from acrid matter contained in a neighbouring sore; or from the destruction of surrounding parts, by which the natural support is removed.

In performing the operation for aneurism, the first step ought to be to obtain a full command of the circulation in the inferior part of the member by means of the tourniquet. This being done, the patient should be so placed, that the diseased limb, on being stretched on a table, is found to be of a proper height for the surgeon; who, as the operation is generally tedious, ought to be seated. The limb being properly secured by an assistant, the operator is now, with a common scalpel, to make an incision through the skin and cellular substance along the whole course of the tumour; and as freedom in the remaining parts of the operation is here a matter of much importance, it is even of use to carry this external incision half an inch or so both above and below the farthest extremities of the swelling.

All the effused blood ought then to be wiped off by means of a sponge; and the softest part of the tumour being discovered, an opening ought there to be made into it with a lancet, large enough for admitting a finger of the operator's left hand. This being done, and the finger introduced into the cavity of the tumour, it is now to be laid open from one extremity to the other, by running a blunt-pointed bistoury along the finger from below upwards, and afterwards from above downwards, so as to lay the whole cavity fairly open.

The cavity of the tumour being thus laid freely open, all the coagulated blood is to be taken out by the fingers of the operator, together with a number of tough membranous filaments commonly found here. The cavity of the tumour is now to be rendered quite dry, and free from the blood which, on the first opening of the swelling, is discharged into it from the veins in the inferior part of the member: the tourniquet is then to be slackened to discover, not only the artery itself, but the opening into it, from whence the blood collected in the tumour has been all along discharged. This being done, the next point to be determined is the manner of securing this opening into the artery, so as to prevent in future any farther effusion of blood. Various means have been proposed for accomplishing this; but the effects of all of them may be comprehended under the three following heads.

1. The effects of ligature upon a large artery having, on some occasions, proved fatal to the inferior part of the member, it was long ago proposed, that so soon as the opening into the artery has been discovered, instead of applying a ligature round it, which, for certain, is to obliterate its cavity entirely, a piece of agaric, vitriol, alum, or any other astringent substance, should be applied to the orifice, in order if possible to produce a re-union of its sides.

2. Upon the same principle with the preceding, viz. that of still preserving the circulation in the artery, it was several years ago proposed by an eminent surgeon of Newcastle, Mr. Lambert, that the orifice in the artery should be secured by means of the twisted suture. A small needle being pushed through the edges of the wound, they are then directed to be drawn together by a thread properly twisted round the needle, as was formerly directed when treating of sutures.

3. Neither of these methods, however, being found eligible for securing the orifice in the artery, we shall now proceed to describe the ordinary manner of performing this operation; which consists in obliterating the arterial cavity entirely by means of ligatures.

The artery being laid bare in the manner directed, and all the coagulated blood being carefully removed from the cavity of the tumour, on the tourniquet being now slackened so as to bring the orifice in the artery into view, a small probe, curved at the extremity, is to be introduced at the opening, in order to raise the artery from the neighbouring parts, so as that the surgeon may be enabled with certainty to pass a ligature round it, without comprehending the contiguous nerves, which, in general, run very near to the large blood-vessels of a limb. By this precaution the nerves may be always avoided; and by doing so, a great deal of mischief may be prevented, which otherwise might supervene. When the disorder is situated either in the ham, or in the usual part of blood-letting in the arm, bending the joints of the knee or of the elbow, as it relaxes the artery a little, renders this part of the operation more easily effected than when the limbs are kept fully stretched out.

The artery being thus gently separated from the contiguous parts, a firm waxed ligature must be passed round it, about the eighth part of an inch or so above the orifice, and another must, in the same manner, be introduced at the same distance below it.

The ligatures being both finished in the manner directed, the tourniquet is now to be made quite loose; and if no blood is discharged at the orifice in the artery, we may then rest satisfied that the operation is so far properly completed.

The wound is now to be lightly covered with soft lint, with a pledget of any emollient ointment over the whole; and a compress of linen being applied over the dressings, all the bandage in any degree requisite is two or three turns of a roller above and as many below the centre of the wound, making it press with no more tightness than is absolutely necessary for retaining the application we have just now mentioned.

The patient being now put into bed, the member should be laid in a relaxed posture upon a pillow, and ought to be so placed as to create the least possible uneasiness from the posture in which it is laid.

From the danger there is of fatal consequences from the bursting of the ligature above the orifice, it is now the practice to make a double ligature, the one at about half an inch distance from the other. Mr. J. Hunter employed this method first, but left the upper ligature not perfectly tight, meaning it merely to take off the force of the blood.

CHAPTER IV. *Herniæ.*

The name of hernia might with propriety be applied to every swelling occasioned by the dislodgment of parts from those boundaries within which, in a state of health, they are contained; but the general acceptation of the term implies a tumour produced by the protrusion of some part or parts from the cavity of the abdomen.

The parts in which herniæ usually appear are the groin, scrotum, labia pudendi, the upper and fore-part of the thigh, the umbilicus, and different points between the interstices of the abdominal muscles. If the situation of such tumours be various, the viscera which produce them are still more so; instances having occurred of the stomach, uterus, liver, spleen, and bladder, being found to form their contents. But a part of the intestinal canal, or a portion of the omentum, are from experience known to be the most frequent cause of their formation.

From these circumstances of situation and contents, all the different appellations are derived by which herniæ are distinguished. Thus they are termed inguinal, scrotal, femoral, umbilical, and ventral; from their appearing in the groin, scrotum, thigh, navel, or belly. When the tumour is confined to the groin, the hernia is said to be incomplete, and is termed bubonocele; but when the swelling reaches down to the bottom of the scrotum, the rupture is then supposed to be complete, and the disease obtains the name of scrotal rupture, or eschiocele.

Of these disorders the inguinal hernia is by much the most frequent; next to that is the femoral. The umbilical is seldom observed in men, or even in women who have not born children.

The causes which tend to the production of hernia, in its more usual form, are these:

1. The containing parts of the abdomen we know to be elastic and compressible; whatever,

therefore, tends to produce a diminution of capacity in the cavity of the abdomen, must occasion a proportional degree of risk of some of the contained parts being pushed from their natural situations. Violent coughing, crying, laughter, or great bodily exertion, are attended with more or less contraction of the abdominal muscles, and particularly of the diaphragm; and as the contraction of these muscles must always diminish the abdominal cavity, these causes therefore are frequently found to be productive of hernia.

2. Falls, in consequence of the derangement they produce in the abdominal viscera, from the sudden and violent shock with which they are often attended, are not unfrequently the immediate causes of hernia.

3. Persons of a preternatural laxity of frame are very liable to herniæ. The containing parts of the abdomen, from the want of sufficient tone and firmness, are unable in such people to resist on all occasions the weight of the different viscera; and they are therefore more particularly exposed to disorders of this kind on the slightest application of any of the causes already mentioned.

4. Sprains are apt to induce a laxity of the part injured; and have therefore a similar influence in inducing herniæ with general laxity.

5. It has been observed that the people of those countries where oil is much used as an article of diet are particularly liable to herniæ.

In whatever parts the parietes of the abdomen happen to be weakest, these various causes will most readily operate in producing herniæ; and accordingly we find, that descents of the bowels usually occur only in such parts.

In whatever situation a protrusion of any portion of the intestines occurs, except in the case of the hernia congenita, as all the viscera are contained within the peritonæum, a portion of that membrane, it is evident, must be carried down together with the parts protruded; and in every such instance, it is this portion of the peritonæum which goes down along with the gut, that is termed the hernial sac. The size of this sac is various in different subjects, and in different stages of the same disorder. On the first appearance of the disease, it is commonly of no very considerable size, as such swellings seldom acquire any great bulk at once: but by repeated descents of the bowels, it comes to be pushed lower and lower, till, in some instances, its bulk becomes very considerable indeed; and when, in this advanced period of the disorder, the sac happens to be laid open, it is found to contain either large quantities of omentum or intestine, and frequently large portions of each. As the peritonæum has this property in common with many other parts of the body, of thickening according to the degree of any gradual extension applied to it, so in many instances the thickness and firmness of the hernial sac are often really astonishing.

All the bad symptoms which are found to occur in herniæ proceed, as may be readily supposed, either from obstruction to the passage of the fæces when the intestinal canal forms the tumour, or from a stoppage of circulation occasioned by stricture on the prolapsed parts: so that the attending symptoms, it is evident, will be always more or less hazardous according to the nature of the parts so protruded.

Thus, when omentum alone forms the substance of hernial swellings, as that organ does not appear to be so immediately necessary for life as many of the other viscera, such tumours accordingly are not so frequently productive of bad consequences, at least they are seldom in any degree so hazardous as when a part of the alimentary canal is either protruded by itself or along with omentum.

Although this, however, is in general the case, yet it does sometimes happen, that even an omental rupture is productive of no small degree of danger. When a stricture so complete upon it occurs as to occasion a stoppage of circulation in the protruded part, mortification with all its bad consequences must be the certain event: and besides, the connection between the omentum, stomach, and other viscera, is such, that a sudden descent of any considerable portion of the former sometimes brings on vomiting, hickup, and other troublesome symptoms: and lastly, although a rupture containing omentum only might not of itself produce any thing bad; yet as the passage through which the omentum has slipped must of necessity continue open so long as that viscus remains protruded, and as that circumstance alone must, so long as it continues, render it more easy for a portion of gut likewise to get down, this of itself is a sufficient reason for entitling even this species of hernia to the serious attention of practitioners.

But whatever the contents of such swellings may be, as their remaining in some instances for a considerable length of time without being productive of any bad symptoms must proceed entirely from the circulation continuing to go freely on, notwithstanding the derangement of parts; so, whenever a stricture occurs up the protruded viscera, sufficient to produce either a stoppage of the circulation, or of the fæcal contents of the alimentary canal, when a portion of gut forms the disease, the following in general are the symptoms which accrue.

In whatever situation a strangulated hernia occurs, the only rational method of cure, it is evident, must consist in the removal of that stricture which prevents the return of the protruded parts. It is that stricture which ought to be considered as the cause of all the mischief; and unless it be removed, nothing effectual can be done for the relief of the patient.

Various methods have been attempted by practitioners for the removal of stricture in these disorders; all of which may be comprehended under two general heads.

1. Such as effect a reduction of the protruded parts, without the interposition of incision or any chirurgical operation properly so called; and,

2. A division of the parts producing the stricture, so as to admit of a replacement of the deranged viscera, constituting what is termed the operation for the hernia.

The remedies to be employed for accomplishing the first of these are, a proper posture of the patient, with the manual assistance of a practitioner; blood-letting, stimulating clysters, opiates, the warm-bath, and proper applications to the tumour itself. If these fail, there is then no other means of cure left but the operation of dividing the integuments, and replacing the viscera.

As soon as the assistance of a practitioner is desired for the removal of symptoms in cases of hernia, the first circumstance requiring his attention is the placing of his patient in such a posture as will most probably favour the return of the protruded parts. Placing the patient's feet over the shoulders of another person, while his body is allowed to hang downwards, and causing him to be a good deal jolted about, has on some occasions answered when other means have failed.

The surgeon should at the same time endeavour to assist the return of the bowels by means of gentle pressure with his hands and fingers. In the inguinal or scrotal hernia, this pressure should be made obliquely upwards and outwards to correspond with the opening in the external oblique muscle: in the femoral hernia it ought to be made directly upwards; in the umbilical and ventral hernia directly backwards.—The swelling should be grasped with one hand at the bottom, while with the fingers of the other hand an attempt is made to push gently the contents of the tumour into their place, always observing that the parts last protruded be first reduced. This operation is by authors termed the taxis.

When the means now mentioned have failed, no remedy affords more relief than blood-letting. The quantity to be drawn ought chiefly to be determined by the strength of the patient. There is scarcely any disease, however, where such large quantities of blood can with propriety be taken from weak people. Bleeding till the patient is in a state of deliquium animi, is frequently known to produce a more effectual relaxation of the muscles than can be done by any other means. On that account it is sometimes advised in cases of hernia, and the practice is now and then attended with advantage.

As an obstinate costiveness is commonly one of the most alarming symptoms of hernia, it has been a common practice to exhibit a variety of stimulating purgatives both by the mouth and anus; but they are very seldom of much service, and in that case almost universally do injury, by increasing not only the sickness at stomach, but the tension and pain of the tumour. When they are to be employed, they ought to be thrown up by the anus. For this purpose aloes and other stimulating substances, but particularly tobacco-smoke, are employed; and although this last remedy, which is to be thrown in by double bellows, &c. does not always act as a purgative, it may be usefully employed as an anodyne. Where an evacuation by stool is wanted, it may in general be readily procured by the injection of warm water, in which a little Castile soap is dissolved, in the proportion of a drachm or a drachm and a half of the latter to a pound of the former. Warm bathing is another remedy greatly extolled, either by general immersion or local application, by means of warm water put into ox-bladders covered with flannel, and laid across the abdomen.

To diminish the size of the tumour, remedies of an opposite quality from these have been used; and though by some this practice has been considered as hazardous, yet by others, particularly by the late Dr. Monro and Mr. Benjamin Bell, more advantage has been found from cooling applications than from those of a different nature. Snow, ice, or cloths dipped in a recent solution of sal ammoniac in water and vinegar, or cold saturnine applications, or cold water and vinegar, have been employed with advantage. If, notwithstanding these remedies, the disease becomes worse, and no probability remains of success, the division of the parts producing the stricture can alone save the life of the patient.

To determine the exact time at which to proceed to an operation has been considered as one of the nicest points in surgery. In general, when every attempt has failed, and no repetition of the former remedies is likely to succeed, the surgeon ought certainly to proceed to the operation. A few hours, even when assistance has been early applied, is perhaps all the time which ought ever to be consumed in trials of this nature. But however necessary this operation may be when a patient's life is in danger, as it is always attended with some degree of hazard, it ought never to be practised where symptoms of strangulation do not exist.

In that kind of hernia called chronic, the circulation of the part forming the hernia, as well as the peristaltic motion of such parts of the alimentary canal as have been protruded, go freely and regularly on. There are many instances of large hernia falling down even to the bottom of the scrotum, and continuing there for many years, without producing any interruption to the usual discharge by stool. All that can be done here is, to prevent any accumulation of fæces in the intestine, by prescribing a proper diet, and the occasional use of gentle laxatives; and obviating any inconvenience which might arise from the weight of the tumour, by the application of a proper truss or suspensory bandage; to warn them of the risk to which they are constantly liable, and to caution them against violent exercise, particularly leaping, and every sudden exertion. The truss ought to be fitted exactly to the part for which it is intended, for, without the utmost nicety in this respect, it must always do more harm than good: for the sole purpose of a bandage, in cases of hernia, is to prevent effectually the falling down of such parts as have been newly replaced. If, therefore, the pad or bolster of the bandage does not bear properly against the opening upon which it is placed, a portion of gut may slip out, and be materially injured by the pressure of the pad.

The circumstances to be attended to in performing the operation for hernia in general are these. A table of convenient size and height being placed in a proper light, the patient must be so laid on it as to relax the diseased parts as much as possible, and then secured by proper assistance. To lessen the contents of the abdomen as much as possible, the bladder ought to be emptied previous to the operation. An incision is to be made with a common round-edged scalpel through the skin and part of the cellular substance, long enough to allow the stricture to be fully exposed. The rest of the cellular substance is then to be divided with the greatest attention. That part of the muscle forming the stricture or ring must next be laid distinctly in view. A small portion of the protruding sac must also be exposed; after which the directory is to be passed between the ring and the sac. A straight probe-pointed scalpel is now to be introduced into the groove of the directory, and by it the ring is to be dilated till the point of the finger can be introduced. The finger is here considered as the safest director; for it being insinuated into the aperture in the tendon, immediately above the protruded parts, the point of the knife is easily introduced upon it; and by keeping the end of the finger always a little before the knife, the opening may be enlarged to any necessary extent without risk of wounding any of the contiguous parts.

By the ease with which the finger is introduced, the operator will be enabled to judge when the ring is sufficiently dilated; and if the strangulation was entirely in the ring, it will now be evident that every obstacle to the reduction must be removed, and of consequence that the prolapsed parts may be returned with little difficulty. If the patient be young, or if the disease has continued a considerable time, such a degree of inflammation frequently ensues in the neck of the sac as to produce thickening and straitness; so that, after the sac and its contents have been entirely freed from the stricture of the ring, the intestines cannot be reduced. We judge this to be the case, when, after the stricture of the ring has been removed, the parts prolapsed do not expand into their natural size, and farther, when they make resistance when we attempt to return them. In this case, the neck of the sac must be opened with the utmost caution, to avoid wounding the parts within it.

If the herniary sac, under the straitened place of its neck, be thin and transparent, and there is little or no reason to suspect an adhesion of the bowels to the sac, the best method, as Dr. Monro, in his publication on the Bursæ Mucosæ, observes, will be to make a small hole in the sac below the stricture, and then to introduce a small furrowed probe, and to cut cautiously upon it. But if the sac be thick and dark coloured, and there is likewise a suspicion that the bowels may adhere to it, the easiest and safest manner will be to make the hole in the peritonæum above the stricture; then to introduce a common probe, bent near its point into a semicircle, with its point directed downwards through the stricture into the sac; and upon the point of it to make, with great caution, another small hole; after which we may either cut upon the probe, or introduce a furrowed probe, and divide the neck of the sac.

After this, the bowels are to be returned by pressure upon the sac, without opening it farther; and the sides of the wound in the skin are to be brought together, and kept so by means of slips of adhesive plaster, though stitches made at the distance of a finger-breadth from each other will exclude the air, and prevent the return of the bowels more effectually. Over these are to be laid several folds of charpie, and the whole is to be secured by a bandage adapted to the nature of the part.

The patient, upon being carried to bed, should be so placed as to have the part upon which the operation was performed higher than the rest of his body, or at least as high as the situation of the part operated upon will allow, in order to prevent a return of the disease. After the operation, opiates are particularly useful, and ought to be repeated as circumstances may require. It is likewise necessary that the patient be kept cool. In plethoric habits, blood-letting is proper, together with a rigid attention to low diet. A frequent use of clysters and gentle laxatives, to keep the belly moderately open, ought not to be neglected. When the constitution has been previously much reduced, instead of blood-letting and a low diet, a nourishing regimen is necessary. The dressings ought not to be removed till the third or fourth day after the operation, when the sides of the wound will be found almost adhering together; and if attention be paid to the subsequent treatment, the sore will be generally healed in two or three weeks. As soon as the wound is firmly cicatrized, a truss ought to be properly fitted to the part, and should never, on any future period of life, be laid aside.

When the hernia is of long standing, and when there is reason to think adhesions have taken place between the sac and bowels, or that mortification has already begun, or that some filaments run across the sac and prevent the reduction, or that there is water in the sac, or that the gut is in danger of being entangled from a part of the omentum being down, a different method of operating becomes necessary.

The patient is to be placed as already directed. The operator is to grasp the tumour with one hand, so as to make the skin tense on the fore part of it, while with the scalpel in the other he divides the skin from one end of the tumour to the other. The cellular substance is by gentle strokes to be divided, till not only the ring, but the whole length of the sac, is laid bare. An opening is now, in the most cautious manner, to be made into the sac by slight scratches, to avoid hurting any of its contents.

In making this perforation, which is considered as the nicest part of the operation, considerable assistance is obtained from the use of the small directory, upon the point of which the fibres of the sac are to be successively raised and divided till an opening is made. The opening is to be enlarged till it admit the fore-finger of the left hand, which serves as a directory for conducting the straight probe-pointed scalpel with which the sac is to be divided through its whole length.

The sac being laid fully open, the parts contained in it ought to be examined with the nicest attention, to discover whether they are all sound or not; and if, upon an attentive inspection, it is found that they are not evidently in a gangrenous state, even although they seem considerably inflamed, they should be immediately returned into the abdomen. When adhesions take place between different parts of the protruded gut, the greatest caution is necessary in separating them. When one part of a gut adheres so firmly to another as not to be separated but with difficulty, it is much better to return the whole, even in that state, into the abdomen, than to run the risk of hurting the intestine materially by using much force. When adhesions occur between the hernial sac and the gut, or between the gut and omentum, if the filaments producing the connexion cannot be otherwise removed, as there is no great hazard in wounding the omentum, and still less in hurting the sac, a very small portion of these may be dissected, and returned with the gut into the abdomen. When the bowels cannot be reduced with ease, the ring is to be dilated by the blunt-pointed scalpel in the manner already directed. After returning the contents of the sac into the cavity of the abdomen, it has been proposed by some authors to pass a ligature round the neck of the sac, with a view of procuring a reunion of its sides, so as to prevent a future descent of the bowels; and various other methods, even actual and potential cauteries, have been proposed: but as none of them yet attempted have been found sufficiently to answer the purpose, the only thing that can be recommended is a well made truss.

When the bowels are actually in a state of gangrene, as the returning of such mortified parts might be attended with the very worst consequences, a great degree of caution is necessary. When the omentum is found in a mortified state, as the excision of a portion of this substance is not attended with much risk, it is the common practice to cut away the diseased parts, and to obviate any inconvenience which might ensue from the hæmorrhagy. We are advised to make a ligature on the sound parts previous to the removal of those which are mortified; whilst the ends of the ligature being left hanging out of the wound, the surgeon has it in his power to remove them when circumstances appear to render it proper. These ligatures on the omentum, however, are frequently productive of bad consequences. No hæmorrhagy of any importance ever occurs from a division of this membrane, even in a sound unmortified state; such parts as have become gangrenous may therefore be freely cut off, and the remaining sound parts be afterwards, without the intervention of ligatures, safely introduced into the abdomen. If a vessel of any size in the omentum has been divided, a ligature may be passed above the vessel itself, and the ends left hanging out of the wound; the threads may be afterwards pulled away at pleasure. When a rupture has been of long duration, it sometimes happens, that from the pressure made by the truss, and other circumstances, portions of the omentum are collected together into hard lumps. If these be small, they may be returned into the abdomen without producing any inconvenience; but if from their bulk and hardness they are likely to do mischief, they ought to be cut off. When part of the omentum is to be removed, it ought to be previously expanded and divided with scissars, which will be more convenient than any other instrument. When again a small portion of gut is found mortified, we are to endeavour, by means of a needle ligature, to connect the sound part of the gut immediately above the mortified spot to the wound in the abdomen already made.

CHAPTER V. *Affections of the External Senses.*

SECTION I. *Affections of the Eye.*

These consist chiefly of specks, films, or excrescences upon the tunics of the eye; abscesses in its globe; dropsical swelling from a morbid increase of the aqueous humour; protrusion of the eye-ball beyond the socket; cancer; guttura serena, or paralysis of the optic nerve, which, however, is scarcely a surgical affection; cataract; and fistula lachrymalis. We can only find space for an observation or two upon the two last.

Cataract.

The ancients, and some of the modern writers, had a confused idea of the seat of the cataract; different authors placing it in different parts of the eye. It consists of an affection of the crystalline lens or of its capsule, by which the rays of light are prevented from falling upon the retina: and is therefore the same disease with the glaucoma of the ancients. It commonly begins with a dimness of sight; and this generally continues a considerable time before any opacity can be observed in the lens. As the disease advances the opacity becomes sensible, and the patient imagines there are particles of dust or motes upon the eye, or in the air. This opacity gradually increases till the person either becomes entirely blind, or can merely distinguish light from darkness. The disease commonly comes on rapidly, though sometimes its progress is slow and gradual. The opacity of the lens is found to be nearly in proportion to the degree of blindness the patient is affected with; it gradually changes from a state of transparency to a perfectly white, or light grey colour. In some very rare instances a black cataract is found. Sometimes the disease is confined to a particular spot of the lens, but generally the whole is affected. The consistence also varies, being at one time hard, at another entirely dissolved. When the eye is otherwise sound, the pupil moves according to the degree of light in which it is placed. This disease is seldom attended with pain; sometimes, however, every exposure to light creates uneasiness, owing probably to inflammation in the bottom of the eye. The real cause of cataract is not yet well understood. Numbers of authors consider it as proceeding from a preternatural contraction of the vessels of the lens, arising sometimes from external violence, though more commonly from some internal and occult cause. The disease is distinguished from the gutta serena, by the pupils in the latter being never affected with light, and from no opacity being observed in the lens. It is distinguished from hypopyon, staphyloma, or any other disease in the fore part of the eye, by the evident marks which these affections produce, as well as by the pain attending their beginning. But it is difficult to determine when the opacity is in the lens or in its capsule. The lens is generally affected; when the capsule is the seat of the disease, it is termed the membranous cataract.

With respect to the treatment: if the disease be in the incipient state, mercury, particularly calomel in small doses, has been attended with some advantage. When any degree of inflammation is present, blood-letting and cooling regimen will sometimes be necessary. Electricity, extract. hyoscyami, flammula Jovis, &c. have likewise been extolled; but after these or other remedies have failed, the cure must depend upon a chirurgical operation. For this purpose two methods are in general use. The first of these, and which was practised for a long time before the other, is called couching. It is done with a view to allow the rays of light to fall upon the retina; and it consists in removing the lens from its capsule, and lodging it in some part of the vitreous humour, where it may be entirely off the axis of the eye, and where it is supposed, in course of time, to dissolve.

The other method is termed extraction, where, after an incision has been made in the cornea, the lens is pushed through the pupil, and then entirely removed from the eye. Each of these methods has been much practised, and it is still a matter of doubt to which we ought to give the preference. The next circumstance deserving attention is the time at which the operation for couching or extracting can with most propriety be performed. Formerly it was thought necessary to wait till the lens had a certain degree of consistence, or was become ripe; but no certain marks of fluidity or firmness have been yet discovered; neither indeed is there any necessity for attending particularly to it, as the operation may be practised in every period of the disease, providing the retina be sound, the iris have the power of contracting, and the cornea be transparent. The proper time for the operation is when the opacity of the lens is so considerable as to prevent the patient from following his ordinary occupation. When this is not the case, or when the patient has the use of one eye, it ought not to be performed, as it is always attended with some degree of danger.

When the operation is to be performed, the following is the method of doing it: and first, of couching the cataract. To guard as much as possible against the effects of inflammation, the patient should be confined, for several days previous to the operation, to a low regimen; and two or three doses of some cooling laxative should be given at proper intervals. After this he is to be seated with his face towards the light; but sunshine ought to be avoided. Some, however, prefer a side-light, both on account of the operator and patient. One assistant is to support the head, while others secure the arms. The operator is either to be seated with his elbow resting upon a table; or, which is preferred by some, he ought to stand, resting his arm upon the side of the patient. The eye being fixed by the speculum, or in such a manner as to allow the whole of the cornea and a small portion of the sclerotic coat to protrude, a couching needle is to be held in the right hand, in the manner of a writing pen, if the left eye be the subject of operation; the ring and little fingers are to be supported upon the cheek or temple of the patient: the needle is to be entered in an horizontal direction through the sclerotic coat, a little below the axis of the eye, and about one-fourth of a line behind the edge of the cornea, so as to get entirely behind the iris. If the needle be of the flat form, the flat side ought to be opposed to the iris, to prevent that substance from being wounded. The point of the needle is to be carried forwards till it be discovered behind the pupil. The operator is now commonly directed to push the point into the lens, and depress it at once to the bottom of the eye; but in this way the lens either bursts through the capsule at an improper place, or it carries the capsule with it, tearing it from the parts to which it is connected. Instead of this, the needle ought first to be pushed into the lens near its under edge, as Dr. Taylor advises, and then carried some way down into the vitreous humour, so as to clear the way for the lens. It is then to be drawn a little back, and carried to the upper part of the capsule, when, by pressing upon it, the lens, if solid, is to be pushed down by one, or, if fluid, by several movements, to the bottom of the vitreous humour. It should then be pushed downwards and outwards, as Mr. Bell directs, so as to leave it in the under and outer side of the eye; where, in case it should rise, the passage of the light would be little obstructed. The needle is then to be withdrawn, the speculum removed, and the eyelids closed; and a compress soaked in a saturnine solution is to be applied over them. Mr. Pellier's method is to cover each eye with a linen bag half filled with fine wool, applied dry, and fixed to a circular bandage of linen passed round the forehead; the whole is retained by a triangular napkin. The patient is then to be laid in bed, upon his back, with his head very little raised; and to be kept in this situation for about a week in a dark room. Unless he be of a weakly habit, he ought to be bled at the neck, or leeched at the temple, a few hours after the operation. He should be kept upon low diet, and get small doses of opiates frequently repeated. His belly should be kept moderately open, by gentle purgatives. The dressings should not be removed till inflammation is at least so far gone that no danger will arise from uncovering the eye, which may generally be about the eighth or tenth day. Sometimes the patient perceives light immediately on the dressings being removed, but more frequently not till some time after.

Upon removing the dressings, if the cataract has again got back to the axis of the eye, a repetition of the operation may become necessary. Some time, however, after the inflammatory symptoms are gone, should be allowed to elapse before any other operation is again attempted; for the cataract frequently dissolves, providing the aqueous humour gets free access to it. Mr. Pott sometimes, when he found the cataract to be of the mixed kind, did not attempt depression, but contented himself with a free laceration of the capsule; in which cases the lens hardly ever failed of dissolving so entirely as not to leave the smallest vestige of a cataract. When the operation is to be performed upon the right eye, the straight needle must either be used by the left hand, or the operator must place himself behind the patient. A needle has been contrived, however, with a large curve, by which the operation may be readily performed with the right hand, while the surgeon is placed before the patient; only the needle is entered towards the inner, instead of the outer, angle of the eye.

The first hint of extracting the lens seems to have been suggested by Mr. Petit, who proposed to open the cornea and extract the lens when it was forced into the anterior chamber of the eye either by external violence or accidentally in couching. At first it was considered as a dangerous operation, and was seldom practised till about the year 1737, when Mr. Daviel proposed and practised extraction in preference to couching. The operation is now performed in the following manner: the patient and operator being placed, and the eye fixed in the same manner as for couching, the speculum, when the operation is to be done upon the left eye, is to be held in the left hand of the operator. It is necessary to make as much pressure as will secure without hurting the eye. Neither ought the cornea to be pressed too near the iris, lest the latter be wounded. The operator now takes the knife, and holds it in the same way as he does the needle for couching; he then enters the point of it with the edge undermost into the cornea about the distance of half a line from its connection with the sclerotic coat, and as high as the centre of the pupil; he is then to pass it across the pupil to the inner angle in an horizontal direction, keeping the edge a little outwards to prevent the iris from being cut; the point is then to be pushed through opposite to where it entered; the under half of the cornea is next to be cut, and at the same distance from the sclerotics with the parts at which the point of the knife went into and came out from the eye.

In cutting the under half of the cornea, the pressure of the speculum upon the eye should be gradually lessened; for if the eye be too much compressed, the aqueous humour, with the cataract and part of the vitreous humour, are apt to be forced suddenly out immediately after the incision is made. The operator then takes a flat probe, and raises the flap made in the cornea, while he passes the same instrument or another probe, rough at the extremity, cautiously through the pupil, to scratch an opening in the capsule of the lens. This being done, the eye should be shaded till the lens be extracted, or the eye-lids are to be shut to allow the pupil to be dilated as much as possible; and while in this situation, if a gentle pressure be made upon the eye-ball at either the upper or under edge of the orbit, the cataract will pass through the pupil more readily than it would do when the eye-lids are open.

If the lens cannot be easily pushed through the opening of the cornea, no violent force should be used, for this would tend much to increase the inflammation. The opening should be enlarged, so as to allow the lens to pass out more freely. When the cataract does not come out entire, or when it is found to adhere to the contiguous parts, the end of a small flat probe, or a scoop, is to be introduced, to remove any detached pieces or adhesions that may be present. The iris sometimes either projects too much into the anterior chamber, or is pushed out through the opening of the cornea. When this happens, it is to be returned to its natural situation by means of the probe already mentioned. Sometimes the opacity is not in the body of the lens, but entirely in the capsule which contains it. The extraction of the lens alone would here answer no useful purpose. Some practitioners attempt to extract, first the lens, and then the capsule, by forceps; others, the lens and capsule entire. Those who have had much practice in this branch of surgery, as Pellier, say they find such a method practicable; but others think it better to trust entirely to time and a cooling regimen for the cure, which, in some instances, has taken place. When the operation is to be performed on the right eye, the operator is either to use the left hand, to take his station behind the patient, or to employ a crooked knife.

After the operation is finished, the eye-lids are to be shut, and the same treatment observed as in couching. When the operation succeeds, the wound in the cornea is generally healed in little more than eight or ten days; but previous to this time, the eye ought not to be examined; and even then it should only be done in a dull light, otherwise it may suffer considerably from the irritation which a strong light might occasion. When the eye is to be examined, if the eye-lids be found adhering together, they ought to be washed with some gentle astringent. With this the eye ought also to be frequently washed afterwards, by which it will gradually recover strength and sight. About the end of the third week the dressing may be entirely removed, and a piece of green silk put over the eyes as a shade; and if every thing has succeeded, the patient may generally go out after a month from the time at which the operation was performed.

It sometimes happens, that in extracting the lens a portion of the vitreous humour is evacuated. This does not in general prevent the success of the operation. The eye soon begins to fill again, and in the course of two or three weeks it is for the most part as large as it was previous to the operation. Whether this be owing to a renewal of the vitreous humour, or merely an aqueous secretion, is not yet determined; though the latter circumstance is generally supposed.

Fistula Lachrymalis.

By this disease is properly understood a sinuous ulcer of the lachrymal sac or duct with callous edges, though every obstruction of this passage is commonly called fistula lachrymalis.

The first and most simple state of the disease is that termed a dropsy of the lachrymal sac. The symptoms are, a tumour between the inner cornea of the eye and side of the nose. This disappears by pressure, the tears mixed with mucus passing partly into the nose, but chiefly back upon the eye and over the cheek.

This state of the disease is what the French have called the hernia, or hydrops sacculi lachrymalis. It is frequently met with in children who have been rickety, or are subject to glandular obstructions; and in this state it sometimes remains for several years, subject to little alterations, as the health or habit shall happen to vary, the sacculus being sometimes more, sometimes less full and troublesome; the contents which are pressed out are sometimes more, sometimes less cloudy; and now and then the disease is attended with a slight ophthalmy, or an inflammation of the eye-lids, but which, by common care, is easily removed. If the sacculus be not much dilated, the discharge small, and produced only by pressure, the chief inconveniences are the weeping eye, and the gumming together of the lids after sleeping: but these, by being attended to, may be kept from being very troublesome; and if the disease makes no further progress, may be so regulated as to render any more painful process totally unnecessary. If the dilatation be considerable, the swelling is more visible, and the quantity of fluid is larger; it is also in this state more frequently mixed and cloudy, and more troublesome, from the more frequent necessity of emptying the bag; but if the patient be an adult, it may, even in this more dilated state of it, be kept from being very inconvenient.

If an inflammation comes on, the tumour is thereby considerably increased, the discharge is larger, as well during sleep as upon pressure; the skin covering it loses its natural whiteness and softness, becomes hard, and acquires an inflamed redness; and with the tears a mixture of something, which in colour resembles matter, is discharged, especially if the pressure be made with any force, or continued for any time.

When the parts are in this state, the contents of the bag have so much the appearance of purulent matter, that they are now generally considered as such, though Mr. Pott and several others have been of a different opinion, considering the fluid as merely mucus under a different form; allowing, however, that pus is sometimes discharged. If the puncta lachrymalia be naturally large and open, and the inflammation confined to the surface of the sac, its contents will pass off pretty freely, and the skin will remain entire.

But when the skin covering the lachrymal bag has been for some time inflamed, or subject to frequently returning inflammations, it most commonly happens that the puncta lachrymalia are affected by it, and the fluid, not having an opportunity of passing off through them, distends the inflamed skin; so that at last it becomes sloughy, bursts externally, and forms an opening in the most prominent part of the tumour, at which the tears and matter contained in it are discharged. When the opening thus formed is small, it commonly heals again in a few days, but it bursts as soon as a considerable quantity of this fluid is collected; and it continues thus to collect and burst alternately, till the opening becomes sufficiently large to prevent any further collection. This state of the disorder exhibits exactly the appearances of a sinuous ulcer, with callous, and sometimes with retorted, edges; and this stage forms properly the real fistula lachrymalis. Tears, mucus, and purulent matter, are now abundantly discharged from the sore. When the bone beneath is sound, this discharge is seldom either acrid or offensive to the smell, for the opening being in general in the under part of the tumour, the matter is readily evacuated; but when any of the contiguous bones are carious, they are not only found to be so by the introduction of a probe, but by the appearance, smell, and effects of the matter upon the neighbouring parts. In this case it is thin, fetid, and commonly so acrid as to fret and corrode the integuments most contiguous to the ulcer; and when the disorder is connected with scrophula or with lues venerea, which is by no means an unfrequent occurrence, the discharge and appearance of the sore will vary according as it happens to be combined with one or other of these diseases.

In the course of treatment of this disease the first attempt should be to recover the natural passage; but if this be impossible, from an obliteration of the sacculus, the following operation must be performed to produce an artificial passage.

The patient is to be seated, and his head properly supported by an assistant; then the sac is to be laid freely open at its inferior part; the nasal duct is to be searched for with a firm probe, or with a conductor made for the purpose; and Pellier asserts that he never fails in finding it. As soon as this is discovered, a conical tube, with a projection at the top, and another in the middle for securing it in its place, must be put upon the conductor, previously furnished with a compressor, and it should be of such a size that the conductor may fit it exactly. The point of the conductor is now to be passed into the lachrymal duct, and being pushed in till it reaches the nostril, which may be known either by inserting a probe into it, or by a few drops of blood falling from the nose, the conductor is to be withdrawn; leaving the compressor upon the brim of the canula, which must be firmly pressed down with the left hand, while the conductor is removed with the other. This being done, the compressor must next be taken out; and to discover whether the canula be at a proper depth, a little milk or water should be injected through it. If the injection pass, it will show that the canula is properly placed. If, on the contrary, any obstruction occur, there will be reason to suspect that it is already pushed too far, and that it presses against the os spongiosum inferius; in which case the canula must be withdrawn, shortened, and reintroduced as before.

The sore ought to be kept open for eight or ten days after the operation with soft lint spread with emollient ointment, and the whole covered with a compress of soft linen secured with a bandage. An injection of milk and water should be daily passed through the canula; and as soon as the sore looks clean and healthy, the dressings should be entirely removed, and a piece of court-plaster laid over it. In this state it is to be left to heal; but the plaster must be renewed, if matter appear to form beneath it. By this method Mr. Pellier finds, that fistula lachrymalis, not depending upon diseases of the contiguous bones or of the constitution, may commonly be completely cured in two or three weeks, which, by the usual practice, might require several months.

SECTION II. *Affections of the Nose.*

Hæmorrhagies.

When the usual means mentioned for this complaint under MEDICINE have failed, recourse must be had to compression. Dossils of lint introduced into the nostrils are sometimes effectual; or the gut of some small animal, tied at one end, then introduced by a probe into the nose as far as the pharinx, and filled with cold water, or that and vinegar, and secured by a ligature, by adapting itself to all the parts, and pressing equally on them, has been attended with advantage. When these remedies likewise fail in their effect, a piece of catgut or wire may be introduced through the nose into the throat, and brought out at the mouth; a piece of sponge, or a bolster of lint of a size sufficient to fill the back-part of the nostril, is then to be fixed to it; the sponge is next to be drawn back and properly applied. Another is to be applied to the anterior part of the nostril and secured. The same may be done to the other nostril, if it be necessary; or the sponge may be of such a size as to fill the ends of both nostrils at the same time. By this contrivance the blood not finding an outlet, will soon coagulate, and prevent any farther evacuation.

Ozæna.

By this is understood an ulceration within the nose which may be occasioned by external violence, by exposure to cold, by irritating substances, or by whatever produces inflammation in the membrane lining the nostrils. Sometimes it arises from venereal infection; and in this case the discharge becomes so acrid as to corrode, and produce caries into the bones of the nose. When the disease is local, and not depending upon any constitutional affection, astringent solutions are found to be the most useful, such as a decoction of bark or that mixed with alum. Dossils of lint dipped in these are to be introduced into the nostrils three or four times a-day, or some prefer the injection of such fluids by means of a syringe as being more effectual. If stronger astringents be necessary, a solution of styptic powder ought to be used. At bed-time, an ointment prepared with zinc or with lapis calaminaris ought likewise to be applied. Upon some occasions the application of a blister to the temple has cured the disease.

Instances, however, occur, where the discharge is occasioned by a collection of matter within the antrum maxillare; and then it is apt to resist every effort till a proper outlet be given to it.

When the complaint is owing to venereal infection, the primary disease is to be attended to, and mercurial preparations are to be applied to the part; but when the bones are carious, till these are removed we need neither expect that the discharge will cease, nor the disease be otherwise completely cured.

Imperforated Nostrils.

Sometimes the nostrils are in part or entirely obliterated. This may be owing to burns; small-pox; different kinds of sores, especially those of a venereal nature; and sometimes it is the effect of original conformation, for it has been observed in new-born children.

When any opening appears in the obstructed nostril, it may be readily dilated by the introduction of a furrowed probe, and then cutting upon it in the course of the adhesion: but when no passage appears, the operator must endeavour, by means of a scapel, to discover one of the nostrils; and when discovered, it must be enlarged by a director and bistoury, as in the former case. The other nostril is to be treated in the same manner. After the openings are formed, they might be preserved of a proper size by the introduction of dossils of lint, which should be frequently cleaned or renewed; but metallic tubes answer the purpose better, and allow the patient to breathe freely through them till a cure be performed. Previous to their introduction, they ought to be covered with soft leather spread with emollient ointment, and retained till the sores are completely healed.

Section III. *Affections of the Mouth and Throat.*

Division of the Parotid Duct.

When the parotid duct is divided, the saliva which it transmits passes over the cheek instead of going into the cavity of the mouth.

When the surgeon is called to a recent division of the duct, he ought to lay the divided ends of it as exactly together as possible, and to retain them in their situation till they are united by adhesive plasters, or by the twisted suture if there be considerable retraction of the parts. But when the portion of the duct next the mouth is entirely obliterated, an artificial passage must be made into the mouth, and an union formed between the opening and that part of the duct which proceeds from the parotid gland. The artificial passage ought to be as much as possible in the direction of the natural duct. For this purpose a perforation of a proper size is to be made obliquely into the mouth with the trocar, from the side of the wound exactly opposite and contiguous to the under extremity of the upper portion of the duct; and then a piece of leaden probe of the size of the perforator should be introduced by means of the canula, and be kept in the cheek till the sides of the opening become callous; when the lead being withdrawn, the extremities of the artificial and natural ducts are to be brought into contact, and retained there by adhesive plaster till the cure is completed. Another method has, in a few instances, been followed by Mr. Latta (see his System of Surgery), of introducing one end of a bit of catgut into the artificial opening, and bringing it out at the mouth, while the other is introduced a little way into the extremity of the natural duct, and retained by adhesive plaster till the wound is healed. Whichever way the operation is done, the patient should live upon spoon-meat, and make as little motion as possible with his lips or jaws.

Hare-Lip.

This consists of a fissure in the upper lip, very seldom in the under one. It is attended with want of substance, and has its name from a resemblance to the lip of a hare. In general, it is only a simple fissure, though sometimes it is double; in which case it renders a cure more difficult to be executed. There are many lips where the want of substance is so great, that the edges of the fissure cannot be brought together, or at least where they can but just touch, and then the attempt should be forborne. It is likewise improper in infants, and ought not to be performed till several months after they have been weaned, when they will have acquired more strength to undergo the operation, and will be less liable to be attacked with bowel complaints, which frequently make them cry at an earlier period of infancy.

In proceeding to the operation, the patient, if a child, should be secured upon a person's knee, or rather perhaps upon a table; but if an adult, he is to be seated upon a chair, in a proper light. The frænum connecting the gums to the upper lip is to be divided; if a fore-tooth project so much as to prevent the parts from being brought properly together, it is to be extracted; or when the fissure runs through the bones of the palate, if a small portion of the bone project, this must be removed. Matters being so far adjusted, the operator is to lay hold of one side of the fissure between the thumb and forefinger, or between the forceps, then with a pair of sharp and very strong crooked scissars, or with a scalpel, to cut off a thin portion of the lip, and to repeat the same thing upon the other side of the fissure, so as to render the whole edges of the fissure completely raw; by which, if the operation be properly performed, a piece will be separated in form like an inverted V. After the incisions have been made, the vessels should be allowed to bleed freely to prevent inflammation; and when the bleeding has ceased, the sides of the wound are to be brought accurately together, and kept in that state by the twisted suture. The first pin ought to be as near as possible to the under edge of the lip; another is to be inserted near the upper angle; and if the patient be an adult, a third pin will generally be necessary, half way between the other two. In passing them, they ought to go rather deeper than half through the lip, that the edges of the wound may be kept properly in contact. An assistant now keeps the parts together, while the operator applies a firm waxed ligature first to the under pin; and having made three or four turns with it in the form of an eight figure, it should then be carried about the second, and in a similar way about the third, care being taken that the thread be drawn of a proper tightness. After the ligature is secured, a piece of lint, covered with some mucilage, should be laid over the wound to protect it from the air; and this is commonly all the bandage necessary. When, however, from a great want of substance, the retraction has been considerable, some advantage is derived from the use of adhesive plasters applied to the cheeks, and tied between the pins. During the time of the cure the patient should be fed upon spoon-meat, and prevented from making any exertion with the lips, otherwise the cure might be considerably retarded. At the end of five or six days the pins may be taken out, when the parts will commonly be found completely united.

In the case of a double hare-lip, the operation should be first done upon one fissure; and when a cure is completed there, it may be done safely upon the other.

Extirpation of Cancerous Lips.

The under lip is much more frequently attacked with cancer than the upper, or indeed than any other part of the body: and as little dependence is to be placed upon external applications or internal remedies, recourse must be had to the knife as the only certain method of cure.

When the disease has not attacked any considerable part of the lip, the diseased part is to be cut out, and the wound cured by the twisted suture. The operation ought therefore to be performed early, to allow the parts to be brought properly together. The general steps of the operation are nearly the same as in the operation for hare-lip, and therefore need not be repeated. It is only to be observed, that all the diseased parts are to be removed, taking care to make the cut in such a way as will most readily admit of the twisted or hare-lip suture. When the parts can be brought together, the lip will have nearly the same appearance as in the operation for hare-lip; but when the disease spreads over a considerable part of the lip, so as to prevent the sound parts from being united after the diseased parts have been removed, all that can be done is to remove the part affected, secure the bleeding vessels, and dress the sore like any other recent wound.

Abscesses, &c. in the Antrum Maxillare.

This disease is known by a pain and uneasiness beginning in the cheek, and extending upwards to the eyes, nose, and ears, together with a swelling, which in the latter stages of the disease tends to a point, most frequently in the cheek. Sometimes a discharge ensues between the roots of the back-teeth, when they happen to penetrate the antrum. Sometimes a discharge of matter from the nostrils takes place, particularly when the patient lies on the side opposite to the tumour. The disease may arise from cold, or whatever produces inflammation in general; but the most common causes are violent fits of the toothach, occasioning excessive pain and inflammation of the membranes of the nose and antrum.

The cure is performed by giving a free discharge to the contents of the tumour; and this is done in two ways; either by extracting one of the two anterior great molares, which are situated under the antrum, and making a perforation with a round trocar through the bottom of the socket; if this has not been already perforated by the fangs of the tooth or eroded, in which case the matter will pass out immediately after the extraction: or the perforation may be made by a sharp, pointed instrument through that part of the antrum which projects outwardly over the molares. As most people wish to avoid the pulling of a tooth, when it does not appear to be absolutely necessary, the perforation is commonly made in the way last mentioned. Some authors, however, object to this, as not giving a sufficiently depending opening to the matter. As soon as the matter is discharged, a plug may be introduced into the perforation, which may be removed frequently to allow the matter to pass out, and to admit astringent solutions of bark, &c. to be occasionally thrown into the cavity of the antrum. In this way a cure is obtained, if the bones be sound; but if they are carious, it is impossible to expect a cure till the diseased portions of the bone exfoliate and be removed. When clotted blood is formed in the antrum, it is to be removed in the same manner. Sometimes the tumour of the cheek is owing to a swelling of the bones, and no matter is found in the antrum: in that case the operation does harm. No external application has yet been discovered for removing such a swelling, though a long-continued course of mercury has been found to be of some service.

Ranula.

This is a tumour under the tongue, most frequently owing to an obstruction in one of the salivary ducts. Sometimes it contains matter like the synovia of the joints, sometimes a fatty matter, now and then stony concretions, but most commonly a fluid like saliva. It often acquires such a size as to prevent sucking in infants, or mastication and speech in adults. When the person attempts to speak, he only makes a croaking noise: hence the name of the disease.

The best mode of treatment is to lay the tumour fully open by means of a scalpel or large lancet, to evacuate its contents completely, and then to wash the cavity with any mild fluid, as milk and water. If the sore be difficult to heal, tincture of bark or other astringents may be used. When the tumour is observed to be filled with a fatty or any other firm substance, it ought to be removed entirely. The only application necessary in the time of the cure is the frequent injection of milk and water, or any other mild fluid, by means of a syringe.

SECTION IV. *Affections of the Ear.*

Sometimes a thin membrane is spread over the mouth of the external passage, while at other times a considerable part of the passage is filled up with a fleshy-looking substance, occasioning deafness. When the first circumstance occurs, the skin is easily divided by a simple incision, and the accretion of its sides may be prevented by a dossil of lint or a bit of bougie inserted between the edges of the wound, and daily cleaned and returned till the part be rendered callous.

When the other cause is present, the incision must be continued considerably deeper, till the resistance be removed, or till the instrument reach near to the membrane of the tympanum, when the operator should desist, lest the membrane should be wounded; then the same kind of treatment may be followed as in the former case. The proper time for performing the operation is when children usually begin to speak; for previous to this the patient may be too weakly to bear it, and after this speech would be impeded.

Sometimes the meatus externus is entirely wanting in the temporal bone. For this an opening through the mastoid process has been proposed; but the operation has not been performed, at least in this country.

Children sometimes push hard bodies into the ear, or different kinds of insects occasionally creep into it, so as to cause considerable uneasiness. Substances lying near the outer end of the passage may generally be extracted by a small forceps; but round, hard bodies situated deeper in the passage, are more readily removed by a crooked probe. When insects are deep seated in the ear, they ought first to be killed, by filling the passage with oil, or any other fluid which proves noxious to them, without hurting the tympanum. They may then be washed out by injecting warm water frequently by means of a syringe.

Wax is one of the most frequent causes of deafness, and it may be readily detected by looking into the ear in a clear sunshine.

Various methods have been proposed for removing wax from the ear; but one, not inferior to any, is to throw in frequently, by means of a common or bag syringe, some warm milk and water, or water in which a little soap has been dissolved. Assistance may likewise be given here, by using along with the injection a blunt probe or fine hair pencil, by which the bottom of the passage may be cleared out. After the wax is removed, the patient ought to guard against the effects of cold by introducing a little wool for some time into the meatus. When deafness is owing to a deficiency of wax in the ear, a little oil of almonds, or even oils of a hotter nature, or soap, or galbanum, &c. have been of service.

Purulent matter is now and then formed in the ears of adults, but oftener in those of children. Sometimes it is produced by ulcers situated in the lining of the meatus, or upon the membrane of the tympanum. It seems to be merely a local affection, and does not, as many have supposed, originate from morbid humours of the system. The remedies best calculated for removing it are such as are of a moderately astringent nature, as a weak solution of saccharum saturni. A little of this may be dropped in two or three times a-day, but it is still better to use a syringe. If the discharge has continued long, it may be proper, in addition to the other applications, to keep open a small blister for some time in the neck, arm, or wherever it may be thought most convenient.

In scrophulous habits, suppurations sometimes occur in the neighbourhood of the ear, and penetrate into the external passage, or into the tympanum itself; after which it is not unusual for the small bones of the ear to lose their connecting membrane, and to be discharged along with the matter, and for caries to ensue in the tympanum; in consequence of which a high degree of deafness is produced, which can never be removed. In such a situation little else can be attempted than to preserve the parts clean and free from smell, which is readily done by injecting a little warm milk and water morning and evening by means of a syringe. If this be neglected, the matter from the carious bones is apt to become offensive; and it commonly continues till the diseased parts are either dissolved and discharged, or probably during the life of the patient.

Besides the affections which may arise in the meatus externus, and may be the cause of deafness, others may occur in or about the meatus internus, or eustachian tube, which may have in part the same effect, though by no means in the same degree. Inflammation and its consequences may originate in the cavity of the tube, or swellings or ulcers in the throat may affect it so as to cause some degree of deafness. When this is the case, it is practicable to introduce a pipe, crooked at the extremity, through the mouth or nose, and then to inject into the mouth of the eustachian tube any mild fluid which may be thought fittest for the purpose, though no great dependence is to be placed upon the attempt.

CHAPTER VI. *Affections of the Neck, Thorax, and Abdomen.*

SECTION I. *Wry-neck.*

Wry-neck may be owing to different causes; as contraction of the skin in consequence of burns, or other kinds of sores; relaxation of the muscles of one side of the neck, particularly the mastoid, while those of the other side continue to act with vigour; preternatural contraction of the muscles of one side of the neck, the others having their usual power; or a bend in the vertebræ of the neck.

When the disease is owing to a contraction of the skin, this is to be divided through the whole of the contracted part, guarding against cutting the external jugular vein. When the contraction of the mastoid muscle is the cause of the disease, the muscle should be divided by gentle strokes, so as to run no risk of wounding the great vessels situated under it. When an incision is made either with a view to divide the muscle or the skin, the head is afterwards, by means of a machine, to be kept in a proper posture during the cure, until new granulations form and fill up the empty space. When the disease is merely owing to a curve of the bones of the neck, the same kind of machinery may be useful with that recommended for cure in the other parts of the spine. But sometimes the disease arises from an affection of the bones of a more serious nature. Here the disease in the vertebræ commonly begins with a slight pain, which gradually becomes worse, and the head is turned over to the sound side. As the disease becomes worse, a fulness can be observed very painful to the touch; and moving the head becomes so distressing as to be almost impracticable. The only method which has been found to be effectual in this case is the insertion of a pea-issue on each side of the tumour, and retaining it till the pain and stiffness are entirely removed.

SECTION II. *Bronchotomy.*

The operation of bronchotomy is an incision made in the trachea, to make way for air into the lungs, when respiration is obstructed to such a degree that life is in danger. If the patient's breathing be already stopped, the operation ought to be done with the greatest expedition; using any instrument which will most readily make an opening in the trachea, as the delay of a few moments will often put a period to the person's existence. Experience has shown, indeed, that in by much the greater number of cases, by a total stoppage of respiration for only five or six minutes, life is irrecoverably destroyed.

In performing the operation, where, from the nature of the case, sufficient time is allowed, the patient is to be laid on his back upon a table, and properly secured by assistants. A longitudinal incision is to be made, about an inch and an half long, through the skin and cellular substance; beginning at the under edge of the thyroid cartilage; the sterno-hyoid and thyroid muscles are then to be separated; the thyroid gland is to be avoided as much as possible, on account of its vascularity. As soon as the trachea is laid bare, the bleeding-vessels, to prevent coughing, are to be secured; then, with a common lancet, a puncture is to be made as high as may seem practicable between two rings of the trachea, of such a size as to admit the introduction of a double canula large enough to allow the patient to breathe freely, and of such a length as neither to be in danger of slipping out, nor of irritating the back part of the trachea. Such a canula has long been recommended by Doctor Monro in his course of surgery. Previous to the introduction, the canula may be put through several plies of linen compress; or these may be first slit half way down and applied so that any of them may be removed and replaced at pleasure. This double canula is to be fixed by a strap round the neck; and when mucus obstructs the passage of the instrument, the inner tube can be withdrawn, cleared, and readily replaced; while the patient is, during this time, breathing through the outer one; and by means of a screw the tubes can be regulated according to the motions of the trachea. After the canula is fixed, it ought to be covered with a piece of muslin or crape, to prevent the admission of dust, insects, &c. As soon as the causes inducing suffocation are removed, the canula is to be withdrawn, and the skin immediately brought over the orifice, and retained there by a slip of adhesive plaster.

SECTION III. *Œsophagotomy.*

By this operation is understood the cutting open the œsophagus, to allow substances sticking in it, and which cannot be extracted otherwise, to be removed. It is only to be done, however, in cases of the most extreme danger, as it is attended with much hazard; and there are only two instances yet on record of its having been performed with success, though there are several instances of wounds in the œsophagus being healed. The operation may be rendered necessary, where obstructions of the œsophagus become so complete as to prevent the passage of nourishment into the stomach, or of air into the lungs. But it is evident that when the obstructing cause is in the under end of the œsophagus, any incision becomes useless.

In performing the operation, the patient is to be secured in the same manner as for bronchotomy, and an incision made through the skin and cellular substance as directly opposite as possible to the part obstructed. If it be done with a view to remove an obstruction, the muscles over the trachea are to be pulled to one side, and the trachea to the other, by means of a blunt hook; by which the œsophagus will be brought into view. If the obstructed part now come in sight, the incision is to be made directly upon the obstructing body, which is to be extracted by a pair of small forceps; but if the obstruction happen to be farther down than we can with safety have access to the œsophagus, the incision is to be enlarged as much as possible, that the forceps may be able to reach and extract it. When the operation is performed, the wound will be difficult to heal, as the sides of it will be frequently separated by the action of deglutition. On this account as great a degree of abstinence as possible is to be advised; and nothing but nourishing liquids, in small quantities, are to be allowed. The patient should be prevented from moving his neck; and the wound is to be healed as soon as possible by the same methods which are used with wounds in other parts of the body. On the other hand, if the operation has been done for the purpose of conveying nourishment into the stomach, when the patient was distressed by a tumour either in the œsophagus itself or in some of the neighbouring parts, it will be necessary to keep the wound open during the continuance of the tumour, or the life of the patient.

SECTION IV. *Paracentesis of the Thorax.*

When either the action of the heart or of the lungs is impeded by fluids collected in the cavity of the pleura, a discharge of these fluids by a perforation is the only chance the patient has for relief. The fluids which collect in the pleura are serum, blood, air, or pus. A collection of water or serum is frequently found in the thorax, combined with dropsy in other parts of the body; but the affection is often local, and it is then chiefly that advantage is to be derived from an operation. Besides in the two great cavities of the thorax, collections of water are frequently met with in the pericardium, and are said to be sometimes discovered between the layers of the anterior mediastinum. The disease is marked by the following symptoms: There is a sense of weight or oppression in the thorax; and difficulty of breathing: the patient has frequently a more uneasy sensation in one side than in the other; has sudden startings during sleep, with a sense of suffocation; is troubled with a frequent dry cough; the pulse is small and irregular; the skin dry, and the urine scanty.

The operation ought to be performed as soon as there is evidence of the collection being the cause of the oppressed breathing, and that there are no signs of this being relieved by expectoration. The operation ought to be done upon the part where the collection is supposed to be situated; and this may be known by the seat of the previous pain, and perhaps by the matter being distinguished between two of the ribs. If no matter flow, it is probably seated in the substance of the lungs; but even in this case, such an opening may be useful, by taking off the support, and giving the abscess an opportunity of bursting. If the undulation of the fluid be general, the operation is to be performed in the following manner: the patient is to be laid in an horizontal posture, with the affected side inclining a little over a table. An incision is then to be made with a scalpel through the skin and cellular substance, between the sixth and seventh ribs, and half way between the spine and sternum, from one to two inches in length, and in the direction of the ribs. The muscles are then to be cut through, keeping as near as possible to the upper edge of the inferior rib to avoid wounding the intercostal vessels and nerves. As there is no occasion for the bottom of the wound being of the same length with the external incision, it may be gradually contracted, so as at last to be only about the half. The pleura being now exposed, is to be divided by slight scratches, taking the assistance of a furrowed probe to prevent the lungs from being injured, in case they should be found adhering to the ribs. If the contrary takes place, the fluid will rush out immediately upon a small opening being made into the cavity of the thorax; but if an adhesion appear, and if it be slight, which may be known by the introduction of a blunt probe, as much of it may probably be separated as to allow the fluid to escape. In case it be considerable, the incision is either to be continued a little nearer to the sternum, or an attempt made in some other part. After the fluid is observed to flow, it will be proper to introduce a silver canula at the opening; by which means it will run more readily off, or can be more easily stopped in case the patient become faint. If the quantity of fluid be not considerable, it may generally be drawn off at once; but if it be great, partial evacuations ought to be made at different intervals, as circumstances may direct.

The canula therefore should be so formed, that by means of a strap put round the body of the patient, it can be readily secured. Its mouth is to be shut by means of a cork. A pledget of emollient ointment is to be laid over the wound; and the whole being fixed by a napkin and scapulary bandage, the patient should be laid to rest. The remainder may be drawn off, probably in a day or two, or as soon as it is supposed the patient can bear it. After the fluid is carried off, the canula is to be withdrawn and the wound healed; or in case the operator be afraid of bad effects being produced upon the lungs by irritation from the canula, though of this there will be little danger, as the lungs will generally be out of its reach, the skin may be so drawn back before the first incision is made as afterwards to serve the purpose of a valve. And for some days after the operation, the incision in the integuments may be brought opposite to that in the pleura, to allow the matter to run off, or to produce a radical cure by exciting a certain degree of inflammation over the lungs and inside of the thorax.

After the matter is evacuated, the wound ought to be kept open a considerable time for the purpose of discharging the matter as fast as it is collected. If the wound be apt to heal up too soon, which will be known by the symptoms of oppression being renewed, it will be proper to keep the passage open by tents, or to introduce a bougie or silver canula a few hours occasionally, till the source of the matter be dried up; which, however, seldom happens for a considerable time, and frequently never. By attending to this circumstance, the patient may enjoy good health; whereas, by the neglect of it, a repetition of the first operation would soon be necessary.

SECTION V. *Paracentesis of the Abdomen.*

This operation is an opening made into the abdomen, in order to empty any quantity of extravasated water collected in that species of dropsy called the ascites.

A fluid in the cavity of the abdomen is discovered by the swelling which it produces; by a sense of tightness in the part affected; by laborious and difficult breathing, especially when in the horizontal posture; but particularly by a sense of fluctuation being communicated to the fingers placed on one side of the abdomen, while the swelling is forcibly struck on the opposite side. There is besides much thirst, a dry skin, scantiness of urine, &c. Whatever may be the influence of diuretics and other evacuations in the cure of general dropsical affections, they are rarely serviceable in local diseases of this kind, and even the operation of tapping seldom cures the distemper; but it commonly gives the patient ease for the present time, and is attended with very little pain.

Upon the supposition that nothing forbids the extraction of the water, the manner of operating is this: having placed the patient in a horizontal situation, as best suited to prevent fainting, and to allow the water to run freely off, the part to be perforated ought to be marked with ink; and the most approved part for the operation seems to be at a point lying at nearly an equal distance between the umbilicus and the centre of the spine of the os ilium, this being most out of the way of any of the viscera, and sufficiently depending to allow the water to escape; and as the spleen is less frequently enlarged than the liver, the left side is generally preferred. Various means have been used for applying an equal pressure in this operation. Some apply pressure by the hands of assistants; others use a broad piece of flannel, or other kinds of cloth, slit a certain way from each end; then the ends are drawn by assistants till sufficient pressure is made. Broad belts are used by some practitioners; but one of the best contrivances for this purpose is the bandage invented by the late Dr. Monro. Till of late years, a puncture was first made with a lancet, then a trocar of the common round form with a triangular point was constantly used; but the entrance of this instrument being always attended with difficulty and pain, a flat trocar is now employed; and that invented by Mr. Andree seems the best which has yet appeared. The bandage being now applied and drawn a little tight, the part to be punctured is to project a little over the edge of the bed. The operator fixes the head of the trocar in the palm, while the fore finger directs the point of the instrument. He is then to push it forwards till he is satisfied, by the want of resistance, that the end of the canula has reached the cavity of the abdomen. The perforator is now to be withdrawn, and the water allowed to flow as long as any of it can be taken off, the bandage being from time to time pulled to favour the discharge. But if the patient become faint, a stop for a few minutes should be put to the discharge every now and then, by placing the point of the finger upon the mouth of the canula. If any of the viscera happen to stop the flow of the water before the swelling is much diminished, a blunt probe is to be introduced, but bent at the end, lest it slip into the cavity of the abdomen. When the serum is thick and gelatinous, it may sometimes be necessary to introduce a larger trocar than the one first employed. When the water does not flow, because it is collected into cysts, the canula is to be withdrawn, and the wound covered with a pledget of simple ointment. The operation may then be renewed immediately, or on the following day, upon the opposite side of the abdomen, or in the most depending part of the tumour, in whatever part of the abdomen it may be placed.

During the operation it is necessary to keep up a pressure on the abdomen, otherwise the patient will be apt to fall into faintings from the weight on the great vessels of the abdomen being taken off, and the sinking of the diaphragm succeeding, in consequence of which more blood flows into the inferior vessels than usual, the superior ones are left too empty, and thus the regular progress of the circulation is interrupted. To obviate this, the pressure must not only be made during the operation, but be afterwards continued. As to the dressing, it has been already mentioned, that the wound may be covered with a pledget of simple ointment; but between the skin and the roller some recommend a piece of flannel dipped in brandy or spirit of wine to be applied. The bandaging in this manner may even have some effect in preventing a return of the disorder. When the water again collects, the operation should be repeated whenever the swelling has acquired a considerable size; and though this operation does not always effect an absolute cure, yet it sometimes preserves life a great many years, and even a comfortable one, especially if the waters have been long collected.

CHAPTER VII. *Affections of the Rectum and Anus.*

SECTION I. *Hæmorrhoids or Piles.*

The treatment of piles has been already considered under the article MEDICINE; but it sometimes happens, that although the means mentioned there have been employed, the disease becomes so violent as to require the assistance of the surgeon. Where the discharge of blood is so great as to endanger the life of the patient, we ought to attempt to stop it either by compression, or by securing the bleeding vessels by a ligature; and here the tenaculum is preferable to the needle, because, when the latter is used, a portion of the rectum is apt to be included in the ligature. When piles arrive at such a size as to obstruct the passage of the fæces, or to produce great irritation, the removal of them by the knife or by ligature becomes necessary. The first of these may be used when their size is of such a nature as not to threaten a dangerous hæmorrhagy; but when this is the case, they ought to be removed by ligature, the manner of applying which has been considered under the treatment of polypi. The dressings are to be of a simple nature.

SECTION II. *Condylomatous Excrescences, &c.*

Excrescences are sometimes produced about the anus, which from their figure get the name of *fici aristæ*, &c.; but they are all of the same nature, and to be cured by the same means. They sometimes grow within the gut itself, but more frequently are situated at the verge of the anus. They vary considerably in their colour, figure, and consistence. Sometimes they are only one or two in number, but commonly all the skin about the anus becomes covered with them. They vary in size from that of ordinary warts to that of split garden beans. They seem originally to be productions of the skin, though at last they sometimes proceed as deep as the muscles. They frequently remain long without producing much uneasiness. When this is the case, they ought not to be touched; but sometimes they become so troublesome as to render their removal necessary.

The softer kinds can frequently be removed by rubbing them often with gentle escharotics, as crude sal ammoniac, or pulvis sabinæ; but the harder kinds are to be removed chiefly by lunar caustic, or by the knife; the latter of which is greatly preferable, and may be done with the utmost safety.

The sores are afterwards to be treated like wounds produced by any other cause. If caustic is to be used, care ought to be taken that it do not injure the rectum.

SECTION III. *Fistula in Ano.*

The fistula in ano is a sinuous ulcer in the neighbourhood of the rectum. When it opens externally, and has likewise a communication with the gut, it is termed a complete fistula; but if it has no communication with the rectum, it is called incomplete. When the ulcer communicates with the gut, but has no external opening, it is named an internal or occult fistula. It is likewise distinguished into simple and compound. The first is where one or more sinuses communicate with the internal ulcer, but where the parts in the neighbourhood are sound. The compound fistula is where the parts through which the sinus runs are hard and swelled, or where the ulcer communicates with the bladder, vagina, os sacrum, and other contiguous parts.

The causes producing the disease may be whatever tends to form matter about the anus, piles, condylomatous tumours, hardened fæces, or any cause which produces irritation and inflammation, so as to end in suppuration. As soon as a swelling about the anus appears to terminate in suppuration, every thing ought to be done which can accelerate the formation of matter. A proper degree of heat, warm poultices, fomentations, and the steams of warm water, are the means best suited for this purpose; and as soon as matter is formed, it ought to be discharged by a free incision in the lowest part of the tumour. Much depends upon the proper treatment here; for if the opening be made too small, or if long delayed, the matter gets into the loose cellular substance, and instead of producing one, produces many sinuses, and these sometimes running to a great depth. The parts ought then to be covered with soft lint spread with mild ointment, and an emollient poultice kept constantly over the whole. By this any remaining hardness will be removed, the cavity will fill up like imposthumous tumours in other parts, and a complete cure will in general soon be made.

It more frequently happens, however, that the practitioner is not called in till the abscess has burst of itself, and till matter has insinuated into the surrounding cellular substance, and formed one or more real fistulæ.

The first thing to be done now is to discover the real course of the different sinuses, and the probe is the best instrument for this purpose. If there be openings in the external surface, there is commonly little difficulty in this. If they run along the perinæum or the muscles, the probe will generally detect them. If they follow the direction of the gut, the best method is to introduce the fore finger oiled into the rectum, while the probe is entered at the external orifice. If there be a communication between the gut and the sinus, the probe may be made to pass till its point is felt by the finger in the rectum. We discover with certainty if a sinus communicate with the gut, when air or fæces are discharged, or when any mild fluid injected returns by the anus.

After the course of the sinus has been discovered, the method of cure is next to be considered. Astringent or escharotic injections, pressure, and setons, are insupportable, on account of the violent pain which they produce. The only method therefore of bringing on a proper degree of inflammation is a free incision along the whole course of the sinus. The course of the different sinuses having been previously discovered, a laxative ought to be given on the day preceding this operation, and a clyster an hour or two before performing it. The patient is to be placed with his back towards a window, while his body leans upon a bed, table, or chair. The finger of the surgeon is to be rubbed over with oil, and introduced into the rectum. The end of a crooked probe-pointed bistoury is then to be passed into the fistula, and pushed against the finger in the rectum, if the fistula be complete. But in cases of incomplete fistulæ, the point of the instrument must be made to perforate the gut before it can reach the finger. Some make the perforation with a sharp-pointed bistoury, which can be made to slip along the side of a probe-pointed one. After the bistoury has reached the cavity of the rectum, the point of it is then to be brought out at the anus, and a cut made downwards to lay the sinus completely open. In this operation the sphincter ani muscle is commonly cut, if the sinus be high; but no inconvenience is found to arise from this circumstance. It sometimes, though rarely, happens, that the sinus goes beyond the reach of the finger, and even as high as the upper end of the sacrum. The only thing which can be done in this case is to cut as high as the finger can go, so as to give a free and easy vent to the matter.

Some practitioners, with a view to prevent troublesome hæmorrhagies, and others to free the patient from the dread of the knife, have proposed to open the sinuses by means of ligature. By introducing one end of a piece of silver or leaden wire into the sinus, then bringing it out at the anus, and twisting the ends together, the contained parts may be so compressed as to produce a complete division of them. But this is both more painful and tedious than the scalpel, and appears to be by no means necessary.

When the presence of an occult fistula is suspected, its existence ought first to be fully ascertained, by examining whether the matter which is passed by stool proceeds from an ulcer in the bowels or from an abscess at the side of the anus. It is discovered by matter from the bowels being mixed with the fæces, and no pain about the anus. In occult fistula, a hardness, swelling, and discoloration are observed upon some spot near the anus, and there is a sensation of considerable pain upon pressure being made upon it. The operation in this is the same with that in the other two varieties of the disorder; only that an opening is previously to be made, by a lancet or scalpel, in that spot where the matter appears to be lodged. By this the sore will be reduced to a complete fistula, and the rest of the operation will be easily performed.

In this manner the different sinuses are to be operated upon, when in a simple state; but in those of a compound nature, where the parts in the vicinity of the sores have been separated from each other by an effusion of matter into the cellular substance, and where all the under end of the rectum has, in some rare cases, been attached from the surroundingp arts, two modes of operating have been recommended; either to remove a considerable portion of the external integuments, so as to give free vent to the matter; or to extirpate all the lower end of the rectum which is found to be detached from the surrounding parts. But from the pain and subsequent distress which they occasion, these methods are judiciously laid aside. All that is necessary to be done here is to lay the detached portion of gut completely open, as in cases of simple fistulæ; but if this be insufficient for allowing the gut to apply properly to the contiguous parts, another incision should be made on the opposite side. If the neighbouring bones be found sound, and the constitution in other respects be unimpaired, a complete cure will probably be obtained.

Section IV. *Prolapsus Ani.*

This is a protrusion of part of the rectum beyond the anus. It is often occasioned by debility of the parts, but is most frequently owing to violent exertions made in the rectum in consequence of irritation. The reduction should be effected as soon as possible; for although this part of the intestine can bear exposure to air much longer than any of the rest, yet allowing it to remain a long time out would be attended with great uneasiness, and probably with danger. In the reduction, the tumour ought to be supported with the palm of one hand, while with the fingers of the other the part of the gut last protruded is to be returned. If the gut has been long exposed previous to the reduction, venesection may become necessary, and gentle astringents may be applied to the part. The patient during the reduction is to be kept in a reclined posture. As soon as the bowels are returned, the proper bandage is to be applied. Such remedies are afterwards to be exhibited as most tend to recover the tone of the parts.

Chapter VIII. *Affections of the Urinary and Sexual Organs.*

Section I. *Stone in the Bladder.*

A variety of causes have been assigned as tending to the formation of calculi in the bladder of urine; as a decomposition of a superabundant quantity of earthy matter from the blood, on account of a sedentary life; certain articles of diet or drink, containing a greater quantity of earthy matter than others; a continued use of solid food without a sufficient quantity of drink; the peculiar action of absorbent vessels; the particular structure of the kidney; the nature of the different excretory vessels; the time the urine may remain in the kidney; the habit of retaining the water in the bladder; particles of blood getting into the kidney or bladder, and attracting the stony matter so as to form a nucleus. A certain change of the vessels of the kidney forming the urine has by some been considered as a more probable cause than any of the former. The formation of calculus sometimes begins in the kidneys, at other times in the bladder.

After a calculus has begun to be formed, it sometimes acquires a great size in a few months from the first obvious symptoms; but sometimes it remains in the bladder for many years without arriving at any considerable size.

The symptoms commonly come on gradually, and bear some kind of proportion to the size and inequalities of the stone. One of the first commonly taken notice of is an uneasy sensation at the point of the urethra, which for some time is perceptible only upon making water, or upon using violent or jolting exercise. This sensation gradually increases; and there is along with it a frequent desire to make water, which is commonly voided in small quantities, and sometimes only in drops. When running in a full stream, it often suddenly stops, though the patient is conscious that a considerable quantity still remains, and feels a strong inclination to void it. If the stone be large, the patient has a constant dull pain about the neck of the bladder, and frequent desire of going to stool. The urine is generally of a limpid colour; but it is frequently thick, depositing a mucous sediment, and when the disease is violent it is often tinged with blood. All these complaints are greatly increased by exercise, especially by riding on horseback; and from a long continuance of pain, the patient's health by degrees becomes much impaired, and unless effectual means are employed for removing the cause of the disorder, death alone puts an end to his misery.

We are rendered certain of the existence of calculus when small pieces of stone are frequently passed along with the urine. When this does not occur, we cannot be certain that the symptoms do not arise from an ulcer or tumour in the body or neck of the bladder, or from the pressure of tumours in the neighbouring parts. In doubtful cases, however, we have one mark by which we can judge with certainty, and that is by means of sounding.

This is performed by introducing an instrument called a sound, formed of steel finely polished, and having the natural curvature of the urethra. The patient is to be laid upon a table or across a bed, with his shoulders raised upon a pillow, to bring the stone to the neck of the bladder, and his thighs a little elevated and separated from each other. A sound adapted to the size of the urethra is to be chosen; and previous to the introduction it is to be laid in warm water till it be of the heat of the body, and then wiped and rubbed over with bland oil, butter, or axunge. The surgeon lays hold of the penis with his left hand, while with his right he introduces the sound with its concave side towards the abdomen. He is now with his left hand to draw the penis gently forward upon the instrument, which is to be gradually pushed into the bladder. If any difficulty occur about the neck of the bladder, this may be obviated by introducing the finger into the anus, and raising the point of the instrument; or the same purpose is more readily answered by depressing the handle of the sound. If still it does not pass with ease, much force ought by no means to be used, lest the instrument perforate the membranous part of the urethra.

As soon as the instrument enters the bladder, if it happen at once to touch the stone, a tremulous motion will be communicated to the fingers of the operator, and the business of sounding is then accomplished, the nature of the disease being now ascertained. Great care, however, is here always necessary, as a few particles of sand, or a hardened state of the bladder, have sometimes communicated the same sensation. If the stone be not soon discovered, the instrument is to be moved in all directions; and should the operator be still unsuccessful, one of the fingers of the left hand is to be introduced into the rectum, so as to raise that part of the bladder in which a stone may probably be concealed. If even this attempt prove ineffectual, the body of the patient is to be put into different positions, and perhaps one of the best is depressing the shoulders and raising the pelvis. By this means a stone may generally be felt, providing it is not contained in a cyst, which very rarely happens. If after all these different attempts the surgeon should fail in discovering the stone, the instrument is to be withdrawn; and if symptoms of stone be strongly marked, and it appear that neither scirrhus nor inflammation, which might give rise to these symptoms, do exist, a second or even a third trial is to be made on the following days.

Various lithontriptics have been recommended for dissolving the stone in the bladder; such as lime water, caustic alkali, soap, &c. but none of them can be conveyed in such a state into the bladder as to be much depended upon, as they undergo the greatest change in the course of the circulation. To obviate these changes, it has been recommended to inject certain fluids of this class through the urethra into the bladder; but this has not been attended with any material advantages, and has generally been found to do injury to the bladder. The only effectual method of removing stones from the bladder is by means of a chirurgical operation; the success of which depends much upon the dexterity of the surgeon, as well as on the constitution of the patient.

When the constitution has been so much impaired that the patient complains greatly of sickness and oppression at stomach, with nausea and an inclination to vomit, especially upon taking food; when he has likewise a constant thirst, and the pulse is as high as a hundred strokes in the minute—an operation is improper till these symptoms are removed. The operation is improper also when the patient labours under a severe fit of the stone; for then inflammation of the bladder is apt to ensue to such a degree as to produce suppuration. By frequent attacks and continuance of these fits, the coats of the bladder are apt to be thickened and greatly contracted. This last circumstance may be known by the introduction of the sound; for then it will stop after getting past the sphincter of the bladder, and cannot be pushed farther without considerable force, and at the same time giving the patient the most exquisite pain. Nor ought the operation to be performed when the bladder is ulcerated, especially where the patient is old and much debilitated, and where the discharge of matter is great.

Children more readily recover from the operation of lithotomy than adults; and old people from the age of fifty-five to that of seventy, whose constitutions have not been broken, are in less danger than those in the full vigour of life, probably owing to inflammatory symptoms being more apt to proceed to a dangerous length in the extremes of age than at the middle period of life. When the constitution, however, is not much impaired by the continuance of the disease, the operation may be undertaken with a probable degree of success almost at any period of the patient's life.

Several methods have been recommended for performing this operation; but there are only two which can be practised with any propriety.

One is, where the operation is to be performed immediately above the pubes, in that part of the bladder which is not covered with peritonæum: the other, where it is done in the perinæum, by laying open the neck and lateral part of the bladder, so as to allow of the extraction of the stone.

The first is now seldom or never made use of as being accompanied with more danger than the last. Of this mode of operating Frere Jacques, a French priest, was the inventor; and professor Rau of Holland improved upon his method, by making a groove in the staff. The celebrated Cheselden used the lateral method of cutting, as it is now with a few alterations generally practised. We shall attempt to describe the different steps of this operation in its present improved state.

The manner of preparing the patient depends upon a variety of circumstances. If he be plethoric, a few ounces of blood should be taken away, and at proper intervals the bowels ought to be emptied by any gentle laxative which will not gripe. The diet should consist of light food for some time previous to the operation. If the pain be violent, opium is necessary. Sometimes it is relieved by keeping the patient in bed with the pelvis raised, so as to remove the stone from the neck of the bladder. He ought not to sit up, or take any exercise, in the time of preparation. The warm bath ought to be used two or three times, and the patient should remain in it half an hour at each time. A laxative ought to be given on the day preceding the operation, and an injection a few hours before it is performed. The patient ought to drink plentifully of some diluent liquor, and to retain the urine several hours previous to the operation. If this cannot be readily effected, a slight compression, by means of a ligature, may be made upon the penis, so as to have the bladder sufficiently distended, that there may be no danger of the posterior surface being hurt by the end of the gorget. The perinæum and parts about the anus should be well shaved.

A table somewhat more than three feet in height, and of sufficient strength, is now to be firmly placed, and properly covered with blankets, pillows, &c. Upon this the patient is to be laid and properly secured; and for this purpose there ought to be two pieces of broad firm tape, each about five feet in length, which are to be doubled, and a noose formed upon them. A noose is then to be put upon each wrist, and the patient desired to lay hold of the middle of his foot upon the outside. One end of the ligature is to go round the hand and foot, and the other round the ankle and hand, and cross again, so as to repeat the returns in the reverse way. A running knot is then to be tied, by which the hand and foot will be properly secured. The buttocks are then to be made to project an inch or two over the table, and to be raised considerably higher than the shoulders by a couple or more pillows, and one ought to be put under his head.

The operator is now to introduce a grooved staff of proportionable size, and open to the very end, through the urethra into the bladder; and having again fully satisfied himself of the existence of a stone, he inclines the staff, if the surgeon be right-handed, obliquely over the right groin, so that the convex part of the staff may be felt in the perinæum on the left side of the raphe. He then fixes it, and delivers it to his assistant, who is to hold it with his right hand, desiring him to press it gently, in order to make the sulcus of the staff project in the direction in which he received it. With his left hand the same assistant is to raise and support the scrotum.

The thighs of the patient being sufficiently separated by the assistants, and the surgeon being seated upon a chair of a proper height, and in a convenient light, he makes an incision with a common convex-edged scalpel through the skin and cellular substance, immediately below the symphysis of the ossa pubis, which is a little below the scrotum, and where the crus penis and bulb of the urethra meet, and on the left side of the raphe, and continues it in a slanting direction downwards and outwards to the space between the anus and tuberosity of the ischium, ending somewhat lower than the basis of that process, by which a cut will be made of three or four inches in length. This incision ought not to be shorter than is here directed, otherwise there will not be room for the rest of the operation. As soon as the integuments are thus divided, he ought to introduce two of the fingers of the left hand. With one he keeps back the lip of the wound next the raphe, and with the other he presses down the rectum. He ought likewise particularly to guard against cutting the crures of the penis, which he can readily feel, and separate at their under part with one of the fingers. He next makes a second incision almost in the same direction with the first, but rather nearer to the raphe and anus, by which he preserves the trunk of the arteria pudica. By this incision he divides the transversalis penis, and as much of the levator ani and cellular substance within these as will make the prostate gland perceptible to the finger. If any considerable vessel be cut, it is immediately to be secured, though this is seldom necessary. After this he will have a view of the membranous part of the urethra, which is distinguished from that covered by the bulb by being very thin. He is now to search for the groove of the staff with the fore finger of his left hand, the point of which he presses along from the bulb of the urethra to the prostate gland, which surrounds the neck of the bladder. He keeps it there; and turning the edge of the knife upwards, he cuts upon the groove of the staff, and freely divides the membranous part of the urethra, from the prostate gland to the bulb of the urethra, till the staff can be felt perfectly bare, and that there is room to admit the point of the finger; and as the finger assists in keeping the parts stretched, and effectually prevents the rectum from being hurt, the incision into the urethra may be made with perfect ease and safety.

The next part of the operation, viz. dividing the prostate gland and neck of the bladder, might, by a dexterous operator, be safely performed with a common scalpel, with the edge turned the opposite way. But to guard against accidents, a more convenient instrument, called the cutting gorget, is now in general use. It was originally invented by Mr. Hawkins of London, and since his time has undergone various alterations. The inner plate, which is blunt, is made to slip forwards to protect the back part of the bladder. The membranous part of the urethra being now divided, and the fore-finger still retained in its place, the point of the gorget, previously fitted to the groove, is to be directed along the nail of the finger, which will serve to conduct it into the groove of the staff; and as this is one of the nicest parts of the operation, the most particular attention is here required that the point of the gorget be distinctly heard to rub in the bare groove, and that nothing is interposed.

In the introduction of the gorget into the bladder, if the assistant could be depended upon, the staff might be allowed to remain in his hand: the operator, however, generally chooses to manage it himself. He now rises from his seat, takes the staff from the assistant, raises it to near a right angle, and presses the concave part against the symphysis of the ossa pubes; satisfies himself again that the point or beak is in the groove, and then pushes on the gorget, following the direction of the groove till the beak slip from the point of the staff into the bladder. The gorget is not to be pushed farther than this, otherwise it may wound the opposite side of the bladder, &c.

The gorget having now entered the bladder, which is readily known by the discharge of urine from the wound, the staff is to be withdrawn, and the finger introduced along the gorget to search for the stone, which, when felt, will point out the direction to be given to the forceps; at any rate, the introduction of the finger serves to dilate the wound in the bladder; and this being done, a pair of forceps of a proper size, and with their blades as nearly together as their form will allow, are to be introduced, and the gorget withdrawn slowly, and in the same direction in which it entered, so as to prevent it from injuring the parts in its return. After the forceps are introduced, and passed till they meet with a gentle resistance, but no farther, the handles ought to be depressed till they are somewhat in an horizontal direction, as this will most correspond with the fundus of the bladder. One blade of the forceps is to be turned towards the symphysis of the pubes to defend the soft parts there, the other of consequence will guard the return. After they have distinctly touched the stone, by moving them a little in various directions, they are then to be opened, and the stone laid hold of, which may generally be done with considerable ease. It frequently happens, however, that when the stone is small, it is not readily felt with the forceps; and instances may happen where the under and back part of the bladder may be so depressed as to conceal the stone. In such a situation, nothing will more readily bring it in the way of the forceps than to introduce the finger into the rectum, and elevate this part of the bladder. Straight forceps are generally used; crooked ones, in some very rare cases, however, may be necessary, and therefore the surgeon ought to be provided with them.

After the forceps has laid hold of the stone, if it be small and properly placed, it may readily be extracted; but if, on the contrary, the handles of the forceps are now observed to be greatly expanded, it is certain the stone is improperly fixed, or that it is remarkably large: in either case it should not be held fast, but allowed to move into the most favourable situation; or the finger is then to be introduced so as to place it properly for extraction. If this cannot be done with the finger, it ought to be allowed to slip out of the forceps, in order to get it more properly fixed; and as the most common form of the stone is flat and oval, or somewhat like a flattened egg, the forceps should have hold of the smallest diameter, while an end presents to the neck of the instrument. The stone should be grasped with no greater firmness than is merely sufficient to bring it fairly out. It should be extracted in a slow and gradual manner.

When a stone is broken in the bladder, all the larger pieces are to be extracted by the forceps, which are to be introduced by means of the finger serving as a director. The smaller parts are to be removed by means of a scoop, or probably the finger may be more convenient; and as the least particle allowed to remain, or which is not washed off by the urine, may serve as the nucleus of another stone, a large quantity of water, properly warmed, is to be injected by a bag and pipe, or by a syringe; and for this purpose the body of the patient should approach at least to an upright posture; and to give the particles of stone an opportunity of collecting near the incision of the bladder, the wound may be stopped for a little after the injection is thrown in.

When a stone is extracted of a regular, firm, and rough surface, it seldom happens that any others remain in the bladder. On the contrary, when it is of an irregular shape, and smooth and polished, particularly in certain places, with impressions formed upon it, there is the greatest probability of others remaining. There are exceptions, however, to these rules; and therefore the operator, instead of trusting to them, should introduce his finger, which will answer the purpose without any other searcher.

If, after the operation, any considerable artery bleeds much, it is to be taken up with a ligature; but if this be impracticable, the hæmorrhagy ought to be stopped by means of pressure, and for this purpose a firm roller introduced at the wound answers sufficiently: and to prevent any stoppage to the discharge of urine, a silver canula, covered with caddis, and dusted over with styptic powder, may be introduced into the wound with advantage.

Sometimes it happens that a considerable quantity of blood, instead of passing off by the wound, is collected in the cavity of the bladder, and may produce very dangerous symptoms. To prevent this as much as possible, immediately upon the operation being finished, the patient's pelvis should be made considerably lower than the rest of his body; by which means the wound will be kept in a depending posture, and the blood will escape more readily by the wound. But if it be found that blood is still lodged in the cavity of the bladder, it must be immediately extracted.

As soon as the bleeding is stopped, the patient is to be untied, a piece of dry soft charpie put between the lips of the wound, and often renewed, and the thighs brought together. He is then to be laid in a bed, in such a way that the pelvis may be considerably lower than the rest of the body, to give a favourable direction to any blood which may afterwards flow from the wound. A considerable dose of laudanum is now to be given. From thirty to fifty drops for an adult will commonly be necessary. From this period, unless the stone has been large and difficult to extract, the patient commonly falls asleep, or at least lies quiet for a few hours; but afterwards generally begins to complain of pain in the under part of the abdomen. Anodynes are now to be given both by the mouth and anus, and warm fomentations, by means of flannels or bladders filled with warm water, are to be applied to the region of the bladder, as the affection seems to be of the spasmodic kind.

An operation for stone in the bladder is much seldomer required in women than in men, on account of the shortness of the urethra in the former allowing a readier passage for the small calculi which get into, or are formed in, the bladder. It is likewise in women more simple, and of course more readily performed. It might be done in the same manner as in the male, but there would be the greatest probability of wounding the vagina. In a few cases, the operation has been performed from the vagina itself; but it is by no means advisable, as stones would not only be extracted with greater difficulty, but, on account of the thinness of the parts, the urine would most probably form a fistulous opening, and a communication be maintained between the bladder and vagina; or cicatrices here might be attended with great inconvenience in child-labour.

In the method commonly practised, the patient being placed and secured in the same manner as in the operation upon the male, the operator introduces a short grooved staff, slightly curved, into the bladder; then by means of the common gorget already mentioned, with its point passed along the groove of the staff, he lays open the whole of the urethra and the neck of the bladder. The staff is now to be removed, the finger introduced upon the gorget, and to feel for the stone, which is to be removed as already directed for the operation on the male subject. Where incontinence of urine occurs after the wound is healed, a pessary is to be used within the vagina, or a sponge applied, or a tin machine to receive the urine.

Stones in the Kidneys.

The symptoms of stone in the kidneys are, pain in the region of the kidneys, sickness, and vomiting, the urine sometimes mixed with blood, at other times with mucus or even purulent matter; but the same symptoms are often induced by other causes, especially from inflammation and suppuration of the kidney. Nephritic complaints have frequently subsisted for a long time, where stones have been blamed as being the cause of them; and yet upon dissection purulent matter alone has been detected. From this circumstance, as well as from the great depth of the parts and the large size of the blood-vessels of the kidney, the operation of nephrotomy could not be performed, but with the greatest uncertainty and most imminent danger, and is therefore never attempted. A few cases indeed have appeared where inflammation induced by a stone in the kidney terminated in abscess, and the stones were taken out; but it was not till they had worked their way out of the kidneys into the cellular substance, so that it only remained to open the abscess and extract them; but otherwise the operation is never to be thought of.

Stones in the Urethra.

Those who are troubled with calculous complaints frequently pass small stones along with their urine; and when these are angular or of considerable size, they sometimes stick, and give much uneasiness. The symptoms are at first pain, then inflammation and swelling, attended with a partial, or total suppression of urine, which, if long neglected, is apt to terminate in a rupture of the urethra, when the urine will be discharged into the neighbouring parts. The greatest attention is therefore necessary to get the stone extracted as soon as possible.

When a stone is in the urethra, unless it be of a large size, or has been long impacted, and the inflammation great, attempts ought to be made with the fingers to push it out; but previous to this, the penis should be relaxed as much as possible, so as to remove a certain degree of spasm which the presence of stone here probable creates. Blood ought to be drawn by general or local means, according as the patient may be of a plethoric or emaciated habit. He should be immersed in a warm bath, and get a full dose of laudanum, and warm oil ought also to be thrown into the urethra. After these remedies have relaxed the parts as much as may be, the extraction is to be attempted.

For this purpose certain instruments have been contrived, particularly a tube containing a pair of elastic forceps to be introduced into the urethra so as to lay hold of the stone. In some cases they certainly might answer the purpose, but they have not been found very useful; and as they may increase the irritation already present in the urethra, they are seldom, if ever, employed. Instead of them, the surgeon uses gentle pressure on the penis to push the stone outwards; and as calculi larger than a field bean have sometimes been passed by the urethra, an operation ought not to be performed till gentler means have been persisted in for some time. When these means have failed, an incision ought to be made immediately upon the stone, which is then to be removed by a probe, or with a pair of small forceps. When a stone is lodged near the neck of the bladder, after the patient has been placed and secured in the same manner as for the lateral operation, while an assistant supports the scrotum and penis, the operator introduces a finger oiled into the anus, to support the stone in its place, and prevent it from slipping into the bladder. An incision is then to be made, and the stone turned out. The after-treatment will be nearly the same as that after the operation of lithotomy.

When, again, a stone has advanced further in the urethra, the best method is to draw the skin strongly forwards or backwards, and then to cut upon it and turn it out, when the skin will slide back so as to cover the wound, and prevent the urine from passing through it; and by this means it will generally heal by the first intention. If part of the urine pass through the wound, and insinuate into the cellular substance, an attempt is to be made with the hand to press it back. If that prove insufficient, a cut is to be made through the skin opposite to the incision of the urethra; but this will seldom be found necessary. If a stone is fixed near the point of the urethra, it may be removed with a pair of forceps; or, if this fail, the urethra is to be dilated with a scalpel; and if this also be insufficient, an incision is to be made as above directed. When the cure is nearly completed, a tube formed of silver or elastic gum, or a hollow bougie, may be used to keep the urethra of a proper size.

The worst part of the urethra for a stone to stick in is that immediately behind the scrotum; for then the urine is apt to pass by the incision into the cellular substance of the scrotum, so as to occasion large swellings there. To prevent this, a stone so situated ought, if possible, to be pushed forwards with the fingers; or if this be impracticable, it should be pushed back into the perinæum by means of a staff. If both methods fail, a cut is to be made at the under part of the scrotum, which is to be well supported, and at one side of the septum, and continued upwards till the stone is felt, when an incision is to be made into the urethra, and the stone extracted as before directed.

SECTION II. *Incontinence and Suppression of Urine.*

Incontinence of urine may arise from various causes, as, from a loss of power in the sphincter of the bladder, while the natural tone of that organ remains unimpaired; or from irritation about the neck of the bladder, produced by the frictions of stones contained in it; or from a laceration of parts by the operation of lithotomy; or from the pressure of the uterus in a state of pregnancy.

When the disease is owing to a want of tone in the sphincter, the cure is very difficult, because the constitution in general is frequently affected. The most useful remedies are tonics, especially Peruvian bark, chalybeate waters, and the cold bath, both generally and locally applied. Cold substances applied to the perinæum are perhaps of greater service than any thing else, as cloths wet with vinegar and cold water, or with a strong solution of saccharum saturni in vinegar; but the best method of applying cold is to dash water immediately from the fountain upon the anus and perinæum. When it arises from the irritation of stones in the bladder, opiates and mucilaginous liquors plentifully used frequently give great relief. When incontinence of urine is owing to a laceration of parts in performing the operation of lithotomy, the disease is nearly of the same nature as that from the cause first mentioned, and therefore the same remedies are of service. When these remedies fail in either of the cases, compression of the urethra prevents any inconvenience arising from the constant dripping of the urine; and for this purpose an instrument termed *jugum penis* is applied to the penis: or, to press against the urethra of the female, pessaries are contrived, which are made in such a way as to be introduced into the vagina, and there to press upon the urethra. They are sometimes made of sponge, but those of cork or box wood well polished are more generally preferred. A small bottle made of elastic gum, and open at both ends for the passage of the menstrual discharge, answers the purpose equally well. Certain cases however occur where pressure upon the urethra is improper, especially where there is a constant desire to pass water; and here much relief is obtained from the use of receivers, which are now suited to both sexes.

We shall here treat only of that species of suppression of urine where the urine is collected in the bladder, but from some obstructing cause is prevented from being discharged. It arises from a variety of causes.

When it arises from a want of tone in the body of the bladder, it is often connected with palsy of the lower extremities; it is frequently owing also to retaining urine too long. The catheter, in this case, is commonly an effectual remedy, and ought to be employed as soon as the suppression is evidently formed, and repeated from time to time, till the tone of the system is recovered by the use of proper remedies. The method of introducing the catheter is the same with that already directed for sounding for the stone.

When the affection arises from spasm about the neck of the bladder, opiates, warm water thrown into the rectum, and afterwards the warm bath, are the best means of producing relief. When it proceeds from scirrhus of the prostate gland, or from other tumours, or from obstructions of the urethra in consequence of gonorrhœa, the treatment to be afterwards described will be found best suited for such complaints. When the suppression arises from the pressure of the uterus in the latter months of pregnancy, change of posture is sometimes found to have some effect; but if this fail, immediate relief can commonly be given by the introduction of the catheter, which in women is for the most part readily done.

Suppression of urine from inflammation affecting the neck of the bladder is one of the most alarming varieties of the disease, as it produces pain, and such a degree of swelling in the parts as to render the introduction of the catheter inadmissible. It may arise from the matter in gonorrhœa passing backwards along the course of the urethra. An improper use of injections has likewise frequently produced this species of the disease. The treatment is nearly the same as for inflammatory complaints in other parts of the body. Blood-letting should be employed, and particularly leeches should be applied to the perinæum. Opiates ought to be given in large doses. Injections of warm water should be frequently thrown up the rectum, and the whole body should be immersed in the warm bath. If these means be properly used, they will very seldom fail of success; but when they do not prove effectual, when the bladder becomes painfully distended, and when every attempt to introduce the catheter has failed, nothing is to be depended upon but a puncture made into the body of the bladder, in order to discharge the water contained in it.

Various methods have been proposed for effecting this operation. Puncturing the bladder above the pubes has been recommended by many respectable authors. The following is the method of doing it: a lancet-pointed trocar, about two inches long, is to be at once introduced through the integuments, about an inch and a half above the pubes, into the body of the bladder. The stilette is to be removed as soon as the water begins to flow through a groove formed in it, and the urine allowed to flow through the canula, which is secured to the body by means of a bandage. A cork is to be fitted to the canula, that the urine may pass off at intervals only. The canula is to be retained till the cause which produced the obstruction is so far removed that the patient can discharge the urine in the natural way. It ought to be removed every three or four days, and cleared from the sordes which adheres to it, otherwise it soon becomes covered with a calculous crust, which renders the extraction exceedingly difficult. On these occasions a firm probe, of sufficient length, ought to be passed through it into the bladder, upon which it may again be easily returned as soon as it is properly cleaned.

This method of puncturing the bladder is not altogether free from objections: the bladder being suspended for a long time on the canula, its tone is sometimes destroyed; and if it happen to slip off the canula, the operation must be repeated; besides, the urine may be diffused in the surrounding cellular substance.

When the bladder is to be punctured from the perinæum, the trocar, which ought to be longer than the one for puncturing above the pubes, is to be introduced at a little distance from the rapha perinæi, and then passed into the body of the bladder, a little to the upper and outside of the prostate gland, carrying the point of the instrument a little upwards, to avoid wounding the ends of the ureter or seminal vessels. Puncturing from the anus, or the vagina in females, are attended with so many inconveniences that they ought never to be attempted.

Section III. *Diseases of the Penis.*

Obstructions of the Urethra.

Obstructions of the urethra frequently occur after repeated or severe attacks of the venereal disease. They may be owing to caruncles or fleshy excrescences in the urethra; to tumours in the lining membrane, or parts contiguous to the urethra, in consequence of inflammation; to spasmodic affections of the urethra; or to strictures properly so called.

Till of late years almost every instance of obstruction in the urethra has been attributed to caruncles, but their occurrence is much less frequent than was formerly imagined. They are rarely found except near the point of the urethra. They are considered to be nearly of the same nature with the warts which grow upon the prepuce or root of the glans in venereal cases. Tumours obstructing the passage of the urine may be occasioned either immediately by inflammation, or in consequence of old sores within the urethra; or tumours, from whatever cause, may be seated in the corpora cavernosa contiguous to the urethra, and may press upon it in such a manner as to cause an adhesion of its sides, and thereby produce stoppage of the urine. Spasmodic strictures of the urethra sometimes arise from stone in the bladder. Sometimes in gonorrhœa there is such a degree of contraction that neither staff nor bougie can enter. This variety of obstruction is known by its coming on suddenly, and going off sometimes almost completely in the space of a few hours. Of the permanent stricture, or stricture properly so called, Mr. Hunter observes, that in most of the cases of this kind which he has seen the disease extends no farther in breadth than if the part had been surrounded with a piece of packthread. He has however seen the urethra irregularly contracted for above an inch in length, owing to its coats or internal membrane being irregularly thickened and forming a winding canal. He further observes, that a stricture does not arise, in all cases, from an equal contraction of the urethra all round; but in some from a contraction of one side, which throws the passage to the opposite side, and often makes it difficult to pass the bougie. In some few cases, he says, there are more strictures than one; he has seen half a dozen in one urethra, and finds that the bulbous part is much more subject to stricture than the whole of the urethra besides; that they are sometimes on this side of the bulb, but very seldom beyond it; and that they are often slow in forming, it being frequently years from the time they are perceived before they become very troublesome. Contrary to the opinion of others, Mr. Hunter doubts very much if the stricture commonly, or even ever, arises from the effects of the venereal disease, or the method of cure; for strictures are common to other passages, and sometimes happen in the urethra where no venereal complaint had ever been.

When obstructions are occasioned by caruncles in the urethra, bougies should be introduced rubbed over with bland oil until a resistance is met with. When a bougie cannot be introduced far enough, one with a smaller point is to be used, but not till the day following, lest the part be too much irritated. They ought not to be allowed to remain long at first, particularly when they occasion a considerable degree of pain.

When suppression of urine arises from swellings in or about the urethra, in consequence of inflammation, an attempt should be made to discuss these immediately, or bring them into a state of suppuration, and discharge the pus as soon as it is formed. But when the nature of the tumour is such as not to terminate in either of these ways, extirpation of the diseased parts, when this is found practicable, is the only probable means of relief. Bougies should at the same time be used to assist in the cure.

When spasmodic affections are present in the urethra, the remedies to be employed are warm emollients, as rubbing the part with warm oil; anodynes, as opium given by the mouth, but more especially by the anus; blood-letting in plethoric habits, and this to be generally and locally applied; blisters put to the penis or perinæum; electricity, after plethora has been removed. Some cases may be treated with bougies; but where the disease is purely spasmodical, they are generally found to be hurtful; though in other cases, when the violence of the disease is so far removed, if they can be introduced, they are of service, by relieving any obstructions which may remain after the remedies above-mentioned have been exhibited. Costiveness ought likewise to be guarded against. The permanent stricture is to be cured by bougies.

Bougies act solely by pressure, and by dilating the part; hence they should be so large as to fill the passage, and sufficiently flexible to be easily introduced. Bougies, when properly made, can sometimes be kept in for six or eight hours together; but the length of time proper for their retention must depend much upon the feelings of the patient. At all times when they give much pain they ought to be removed, and not introduced again till the part is in a state fit for receiving them. They should be gradually increased in their size till the passage returns to its natural dimensions. They ought to be continued for some time after, till it appear that there is no danger of a return of the complaint.

Phymosis and Paraphymosis.

In *phymosis* the prepuce is thickened, and contracted before the glans, so that it cannot be readily drawn behind it. In some people there is a constitutional phymosis from the natural straightness of the prepuce. Sometimes it arises from the matter secreted by the odoriferous glands at the root of the glans being confined and becoming acrid; sometimes from an anasarcous swelling of the scrotum and penis; but most frequently from venereal virus.

The cure must depend upon the nature of the cause producing the disease. If the symptoms be inflammatory and of no long continuance, fomenting the parts frequently with warm emollient decoctions, or bathing them in warm milk, and then applying emollient poultices, or keeping the diseased parts constantly moist with a cold astringent solution, and turning the penis upwards and supporting it against the belly, commonly give relief. If the inflammation has arisen from a venereal cause, part of the fluid ought frequently to be injected, by means of a syringe, between the prepuce and glans, so as to wash off any matter which may there be concealed; but if the inflammation still continues to increase, blood-letting is necessary, both general and local. The veins of the penis are sometimes advised to be opened with a lancet; but this is unsafe on account of the nerves. Leeches may be applied; but care must be taken, in venereal cases, lest the bites of these animals, by absorbing venereal matter, turn into chancres. Along with the remedies already advised, gentle laxatives, low diet, and abstinence, ought to be prescribed. But if, after due perseverance in these means, it is found that they have had little effect in removing the disorder, or perhaps that the symptoms are constantly increasing, and that chancres are confined under the prepuce; in that case it is necessary to slit open the prepuce, which is best done by a sharp-pointed bistoury, concealed in a grooved directory. This is to be introduced between the prepuce and glans, till the director is found by the finger to have reached the upper or back part of the prepuce. The operator is now to keep the director firm with one hand, while with the other he pushes forward the knife till its point passes through the prepuce, then drawing the instrument towards him, he cuts the prepuce through its whole length.

The operation being performed, the parts are to be washed and cleaned with warm water, and the sore dressed with a little soft lint, and a compress of linen laid over it. The whole may be retained by a small bag properly adapted, and secured by two straps to a bandage put round the body. This bag may be left open at the under end, to allow the patient to make water, without removing the dressings; but if this be found impracticable, the dressings may be removed with little inconvenience. If the glans be much inflamed and excoriated, care should be taken to insert lint spread with emollient ointment between the glans and prepuce, otherwise troublesome adhesions are apt to ensue. It is evident, that when this disease is of the venereal kind, the sore will not readily heal till the poison be eradicated from the constitution.

In some cases of phymosis the preputium is so remarkably long and the contraction so much confined to the point, that a circular incision is preferable to a longitudinal one; and it is easily effected, by separating such a portion as may be found necessary of the whole circumference of the prepuce. The dressings in this case are the same as when the prepuce is slit open.

Paraphymosis is the reverse of phymosis, being formed by a retraction of the prepuce, producing stricture behind the glans of the penis. Like the former disease, it arises most frequently from a venereal infection, but may be produced from whatever preternaturally enlarges the glans or constricts the prepuce.

In the incipient state, the patient may generally be relieved by the surgeon pushing the glans gently back with his thumbs, while with his fingers he brings the prepuce gradually forward. But a more effectual method than this is to inclose the glans with one of the hands, and press gently on all sides, by which the fluids forming the enlargement will be pushed into the body of the penis behind the stricture. If this method be persevered in for a considerable time, it will generally be found to answer the purpose: but should it prove ineffectual, we may try the effects of cold applications; and the best seem to be those of the saturnine kind. When the penis is evidently much swelled and inflamed, the patient should be kept cool, gentle laxatives and low diet should be prescribed, and a number of leeches applied to the penis. Should the disease still continue to increase, and an œdematous swelling appear about the under part of the prepuce, an operation is necessary to prevent a mortification from taking place in the glans. An incision is to be made on each side of the penis immediately behind the glans, so large as completely to divide the stricture. The wound ought to be allowed to bleed freely: after which a pledget spread with simple ointment is to be applied, and an emollient poultice laid over the whole.

Incomplete Urethra.

In children, especially males, the urethra is sometimes incomplete, ending before it reaches the usual place of termination. Sometimes it does so without any external opening, at other times it opens at a distance from the common termination. In the first case, a small trocar is to be introduced in the direction the urethra ought to take, till the urine be discharged; after which, the passage is to be kept open by the use of bougies, till the sides be rendered callous and an opening preserved. In the other case, as the opening which is already found affords a temporary passage for the urine, it will be better to delay doing any operation till the patient be farther advanced in life, when it is to be performed as in the former case.

After the operation, a piece of flexible catheter may be introduced, as well for the purpose of rendering the passage free and callous, as for carrying off the water till a cure is made.

Amputating the Penis.

This operation is found necessary in certain diseases which will not yield to other remedies; as in cases of mortification and cancer. The following is the method of performing it:

A circular incision is first to be made through the sound skin a little beyond the diseased parts; the skin is then to be drawn back by an assistant, and the body of the penis divided by one stroke of the knife, immediately at the edge of the retracted skin. The principal arteries, which are two or three on each side, are next to be secured by ligatures: and if an oozing of blood still continue, the surface of the sore ought to be dusted with some styptic powder. To allow the patient to make water, a silver canula is to be introduced into the urethra, and retained there by two small ligatures fixed to the side of the canula, their other extremities being fastened to a bandage put round the body. The wound is to be dressed with soft lint, kept in its place by a piece of linen previously perforated for the introduction of the canula. The dressings are to be kept on by a narrow roller passed a few times round the penis, which, by gently compressing the penis upon the instrument, will effectually prevent any farther discharge of blood. The after-treatment of the sore should be similar to wounds in other parts of the body. But it will not be necessary to make any further compression of the penis upon the canula, as the discharge of blood will, previous to this time, be entirely stopped. The tube is to be allowed to remain in the urethra during the whole time of the cure.

Before any operation of this kind is attempted, the surgeon ought to examine attentively whether the disease be in the penis itself, or only in the skin, as the prepuce alone is frequently so much enlarged and otherwise diseased as to give cause for suspicion that the glans and body of the penis are likewise affected. This precaution is the more necessary, as several instances have occurred where the glans and body of the penis have been removed, and, after the operation, have been found perfectly sound. Previous to amputation, therefore, where there is any cause for suspicion, the prepuce should be slit open, and the glans examined, so as to avoid amputating more than what is absolutely diseased.

It sometimes happens that the frænum of the penis is so short as to give considerable uneasiness in time of an erection. When this is the case, it may be safely divided by a pair of scissars, or by a sharp-pointed bistoury, and the wound dressed with a little charpie.

Fistula in Perinæo.

The term implies a sinuous ulcer in the perinæum, commonly communicating with the urethra, but sometimes opening into the bladder. The same term is also applied to similar sores opening into the scrotum, or into any part of the penis.

The disease may arise from wounds in the bladder, and of the urethra, from external violence; from a laceration of parts when performing the operation of lithotomy; from incision into the urethra for the extraction of calculi impacted there; from sinuses producing matter capable of corroding the membranous part of the urethra; from suppuration in the perinæum in consequence of inflammation; from the urine passing through an opening in the urethra into the perinæum or other neighbouring parts, and rendering the edges of the sore callous; and most frequently the disease is occasioned by venereal complaints.

In the treatment of this disease, when it is the consequence of a general affection of the system, a removal of the primary disorder is necessary before a cure can be attempted. When the complaint is of a local nature, a simple incision into the sinus is all that is necessary; and for this purpose a staff is to be introduced into the urethra, so as to pass the opening at which the urine is discharged. A probe, or a small director, is now to be passed at the external opening of the sore till it reach the staff; and cutting upon it, the sinus is to be laid open through its whole length till it terminate either in the urethra, or, if necessary, in the bladder itself. When more openings than one are present, they are to be treated in the same manner; and if the sinuses are found to be remarkably hard, the removal of a small portion of the diseased part will expedite the cure, though the consequent inflammation and suppuration will render this seldom necessary. After the operation, the wound is to be dressed with pledgets of emollient ointment, so as to allow it to fill up completely from its bottom. The whole is to be covered with a pledget of emollient ointment; and proper compresses being applied over it, the dressings are to be supported by a T bandage.

If symptoms of inflammation be violent, an emollient poultice is to be applied in the course of twenty-four hours after the operation; and as soon as free suppuration is formed, light easy dressings are to be used till the sore is completely healed.

Hydrocele.

Every tumour formed by a collection of water might with propriety be named hydrocele, but the chirurgical acceptation of the term implies a watery swelling situated in the scrotum or spermatic cord. Hydrocele is either anasarcous or encysted. In the former, the serum is chiefly diffused in the cellular substance: in the latter, the water is collected in a distinct bag. The scrotum, with its contents, are liable to both varieties of the disease; so is the spermatic cord with its coverings.

Anasarcous Hydrocele of the Scrotum.

As soon as water has collected in any considerable quantity in the scrotum, a soft, inelastic, colourless tumour is observed over the whole of it; impressions are easily received and obtained for some time: the skin at first preserves its natural appearance, and the rugæ of the scrotum are not much altered; but as the swelling advances, they gradually disappear, and are at last totally obliterated. The swelling, from being at first soft, and of a consistence similar to dough, by degrees turns more firm, and the skin at last acquires an unnatural white shining appearance. The tumour at length becomes large; and though originally confined to the scrotum, it at last spreads up the groin. The penis likewise becomes affected, and often so swelled and distorted as to excite much inconvenience and distress; and although the scrotum is composed of parts which readily admit of dilatation, the tumour sometimes becomes so enormous that it bursts from one end to the other.

In the surgical treatment of this disease punctures made with the point of a lancet are most advisable, as large scarifications, in anasarcous habits, are sometimes apt to produce inflammation and mortification; while simple punctures readily heal, and can be renewed with very little pain as frequently as may be necessary; and besides, punctures are equally useful with the incisions; for as the cells of the scrotum communicate freely, if the punctures be made fairly through the skin, the water drains off very readily, though not so soon as by scarification. Previous to the operation, besmearing the part with some tough ointment of an innocent nature, and afterwards keeping it as dry as possible by a frequent renewal of dry soft linen cloths, in order to imbibe the moisture, is here a necessary piece of attention. The want of this seems to be the cause of much of the mischief which frequently ensues from operations of this kind. When scarifications or punctures go wrong by beginning to inflame and turn painful, &c. a cold solution of saccharum saturni, applied upon soft linen, proves most effectual in putting a stop to the farther progress of the inflammation, and affords most immediate relief to the patient in the present distress. Lime-water, employed in the same manner, proves also a very useful application. When, however, the disorder proceeds to gain ground by a real mortification coming on, we should immediately have recourse to bark and other medicines usually employed in such affections.

Hydrocele of the Tunica Vaginalis Testis.

In the healthy state of the body, a small quantity of aqueous fluid is exhaled for lubricating the surface of the testicle, the superfluous part of which is absorbed by vessels appointed for that purpose. When the secretion of this fluid is either morbidly increased, or its absorption diminished, a preternatural collection of water is formed in the cavity of the vaginal coat, and hydrocele of the vaginal coat produced.

The symptoms are, a fulness at first observed about the inferior parts of the testicle, and most remarkable when the patient is erect, becoming gradually more tense as the disease advances; the tumour by degrees changing from the globular to the pyramidical form; no degree of pressure making the swelling disappear at any period of the disease. In the early part of the disease, therefore, if it be not combined with hernia, or with a hydrocele of the cord, the spermatic process may be distinctly felt, because the swelling does not extend beyond the scrotum. In its more advanced state it cannot be distinguished: the weight of the tumour now drags the skin of the neighbouring parts so much as to cause the penis almost to disappear; and in this state of the disease the testicle cannot be felt without much difficulty. On a minute examination, a hardness is always to be felt along that part of the scrotum where the testicle is situated; and at this point pressure excites some uneasiness. Fluctuation of a fluid may in general be distinguished through the whole course of the disease. In late stages, however, the appearance of a fluid is not very evident.

The transparency of the tumour has been generally supposed to be the principal criterion of this species of the disorder; but this must depend upon the nature of the contents, or thickness of the sac; so that, though the transparency of the tumour is a certain sign of the existence of water, its opacity cannot upon any account be considered as an indication of its absence. Through the whole course of the disease the tumour is not attended with pain, but some uneasiness is commonly felt in the back by the weight of the swelling of the spermatic cord. This is more particularly the case when a suspensory bandage is not used.

In the radical cure of hydrocele, in whatever way it is attempted, some degree of fever and inflammation will take place. Under the circumstances mentioned in the prognosis, the operation, if properly performed, is generally attended with the most complete success. But if the patient be very old, infirm, and diseased, an operation may be attended with such a degree of inflammation, and consequent suppuration, as to be in danger of destroying a constitution already greatly impaired, and therefore ought not to be performed.

Various methods have been proposed for the cure of hydrocele, all of which may be reduced to two general heads: such as have in view only a temporary relief, and which is therefore termed the palliative cure; and such as are meant to effect a radical cure. When the tumour has become so large as to be inconvenient from its size, an evacuation of the water by surgical means becomes necessary. In this case, if the patient either refuses to submit to the operation for a radical cure, or if his state of health render that operation improper, the palliative treatment, or a mere evacuation of the water by puncture, is the only means which can be employed.

The intention of every means now in use for the radical cure of this species of the disease, is to induce such a degree of inflammation on the parts in which it is seated as may obliterate entirely the cavity of the tunica vaginalis, by making it adhere to the surface of the testicle. The means at present generally employed for effecting a cure are, excision of the tunica vaginalis; the application of caustic; the use of a seton; a simple incision of the sac; and the injecting of acrid liquors into the tunica vaginalis, after drawing off the fluid which it contained. The method of cure, by the removal of the vaginal coat, is, first, to lay open the vaginal coat, and then to cut it away by different snips of a pair of scissars. The sac being removed, the parts are to be dressed and treated in the same manner as in the operation where simple incision is used.

The cure by caustic is attempted in the following manner: the scrotum being shaved, a piece of common paste caustic, properly secured with adhesive plaster, is applied, of about a finger's breadth, the whole length of the tumour; and if, on removing the caustic, it has not penetrated into the vaginal coat, an opening is made in it with a scalpel, so as to evacuate the contents, lay bare the testicle, and admit of proper dressings. But Mr. Else, one of the latest writers in favour of the method of cure by caustic, says, that there is no necessity for such an extensive application of caustic as many have recommended; that an eschar of the size of a shilling is sufficient; that this may be always fully obtained by the application of caustic paste of the size of a sixpence, which is to be laid on the anterior and under part of the scrotum, and to be properly secured by plaster, in order to prevent it from spreading. The caustic commonly produces all its effects in five or six hours, and may then be removed. At this time digestives, or an emollient poultice, must be applied over the scrotum, and the whole suspended with a bandage. Inflammation, Mr. Else observes, is soon induced over the whole tunica vaginalis; and the febrile symptoms which succeed he advises to be kept moderate by blood-letting, injections, emollient poultices, and a low regimen. In a few days the eschar of the scrotum separates and comes away; and in a gradual manner, in the course of four, five, or six weeks, the whole tunica vaginalis comes off, when the wound for the most part soon heals, and a complete cure is obtained.

Where it is intended to treat hydrocele by means of a seton, it may be done in the following manner: an opening is made with a scalpel, or the sharp-pointed bistoury, in the superior part of the tumour, large enough to admit with ease a thick cord of common white sewing silk. A director, with an eye at one end, in which the cord is inserted, is introduced at this opening; and its farther extremity being carried down to the most depending part of the tumour, an opening is there made, of about half an inch in length, by cutting open the director with the bistoury;

The director being now drawn till a sufficient quantity of silk is left hanging out below, the operation is in this manner finished. Another very simple method of introducing a seton is by means of a silver canula and perforator.

In the operation for a radical cure by incision, the patient being laid upon a table of convenient height, and properly secured by assistants, with the scrotum lying nearly on the edge of the table, the operator with one hand should grasp the tumour behind, so as to keep it firm and make it somewhat tense anteriorly: with a common round-edged scalpel in the other hand, he should now divide the external integuments by one continued incision from the upper to the under end of the tumour. An opening is next to be made in the vaginal coat with a large lancet, or a sharp-pointed bistoury, at the upper end of the first incision. This opening should be of such a size as freely to receive the finger of the operator, which is to conduct a blunt-pointed bistoury so as to divide the sac down to its bottom, which is considered as being of advantage, by preventing partial adhesions and the risk of a return of the disease.

The incision being completed, the testicle is now brought fully into view; and if the tunica vaginalis be sound, the dressing may be finished immediately. But if the sac be diseased, it is to be removed, which may be readily accomplished by a scalpel or bistoury.

Hydrocele of the Spermatic Cord.

Anasarcous hydrocele of the spermatic cord sometimes accompanies ascites, and at other times it is found to be confined to the cellular substance in or about the spermatic cord. The causes of this disease may be obstructions in the lymphatics leading from the part, in consequence of scirrhous affections of the abdominal viscera, or the pressure of a truss applied for the cure of hernia.

When the affection is connected with anasarca in other parts, it is then so evident as to require no description. When it is local, it is attended with a colourless tumour in the course of the spermatic cord, soft and inelastic to the touch, and unaccompanied with fluctuation. In an erect position of the body it is of an oblong figure; but when the body is recumbent, it is flatter and somewhat round. Generally it is no longer than that part of the cord which lies in the groin, though sometimes it extends as far as the testicle, and even stretches the scrotum to an uncommon size; an instance of which is related by Mr. Pott, who from a swelling of this kind discharged eleven English pints at once. By pressure a great part of the swelling can always be made to recede into the abdomen. It instantly, however, returns to its former situation on the pressure being withdrawn.

When the tumour is connected with general anasarca of the system, it can only be cured along with the rest of the diseases; but when the swelling is local, the remedy is also to be locally applied. An incision is to be made of such a size as may be sufficient for discharging the whole of the water; in the performance of which, attention is necessary to guard against hurting the spermatic vessels. The contents of the tumour being discharged, the sore is to be treated like any other simple wound.

Encysted hydrocele of the spermatic cord sometimes begins in the upper, but generally at the lower part of the spermatic cord. On its first appearance it is so small as to give little or no trouble; hence it is seldom particularly attended to till it has acquired a considerable size. By degrees it extends as far the abdominal muscles, and sometimes reaches to the bottom of the scrotum; and to a person unacquainted with the appearance of the disorder may be mistaken for a hydrocele of the tunica vaginalis. But here the tumour is always above the testicle, which is distinctly felt below; and even in the advanced state of the disease the testicle is found in the back part of it perfectly unconnected with the swelling; whereas in the advanced stages of hydrocele in the vaginal coat, although some hardness is discovered where the tunica vaginalis adheres to the testicle, yet when the swelling is great the testicle cannot be distinctly felt. In the encysted hydrocele of the cord, the figure and size of the penis is little altered; whereas, in cases of common hydrocele, the penis frequently disappears almost entirely. In other respects the two diseases are nearly similar. It sometimes happens that the water is contained in two distinct cells. In that case the tumour is somewhat puckered up or diminished in its diameter. A similar appearance also occurs when this variety of the disease is connected with hydrocele of the tunica vaginalis, which sometimes takes place.

The only other tumours with which this one may be confounded are, the anasarcous hydrocele of the spermatic cord, and a real hernia. But in neither of these is the fluctuation of a fluid perceptible, and to the touch they are both soft and inelastic; whereas, in this variety of hydrocele, the tumour has a springy feel, and a fluctuation is sensible to the touch; and in both the one and the other the swelling recedes somewhat upon pressure, which it never does here.

From hernia it is chiefly distinguished by the tumour beginning some way down the cord. In hernia the tumour turns less when the patient is in an horizontal posture, and is considerably affected by coughing and sneezing: but this kind of hydrocele is not altered in size by any such circumstances, nor has it the common symptoms which attend a hernia.

Infants are frequently subject to this disease, as well as to an anasarcous swelling of the cord, and an œdematous tumour of the scrotum. But here the complaint is seldom permanent; for in most instances it readily yields to gentle friction, with any stimulating or astringent application, as a strong solution of sal ammoniac in vinegar, &c. But in adults, the cyst, in every variety of encysted hydrocele, becomes so firm as not to be affected by external applications; so that when the tumour becomes large, it is necessary to use means for producing either a palliative or radical cure, in the same manner as is done for a hydrocele in the vaginal coat.

Varicocele, Circocele, Spermatocele, and Pneumatocele.

Varicocele is a preternatural distension of the veins of the scrotum, which in this state form a tumour of hard knotty inequalities, seldom painful, and generally attended with no inconvenience excepting what arises from its bulk. *Circocele* is similar in its nature to the former, but situated in the spermatic cord, extending from the abdominal ring to the superior part of the scrotum, and produced by a varicose state of the spermatic vein. Both of these disorders are occasionally produced by obstruction in the veins; but are most frequently owing to a relaxed state of these vessels: to which we may add, that on account of the smallness of the corresponding artery, they are not sufficiently affected by its influence. The tumour produced by these disorders is sometimes so large as to appear like a hernia or hydrocele; but we distinguish it from these by the touch, for varicose veins are like worms filled with elastic matter. We have another mark upon which we can still more depend: the tumour in the erect posture of the body is much increased, while in the horizontal situation it almost entirely disappears.

Another disorder is observed by late authors, where a collection of blood is sometimes found within the tunica albuginea testis, and is supposed to be a kind of hæmatocele, or more probably varicocele. Sometimes the collection is so considerable, that a fluctuation resembling that of a hydrocele of the vaginal coat of the testicle, is observable. When this is mistaken for hydrocele, and an opening is made into it with a trocar, a discharge is produced of a dusky-coloured blood, somewhat resembling thin chocolate: but though the tumour may be diminished by the evacuation thus obtained, yet the alteration is inconsiderable; nor is the patient ever relieved, but on the contrary made worse by such an operation. Castration, after this, becomes necessary; but even this has been found ineffectual: so that the patient had better be advised to trust to nature, assisted by a proper suspensory bandage, than to suffer the attempt of a radical cure; for it has been observed, that in some instances they have remained stationary for many years, whereas they never fail to become much worse by any attempt to evacuate the fluid.

When tumours, or the pressure of a truss, have been the cause of such complaints, a proper attention to these ought to be the first attempt towards a cure. But when a relaxed state of the veins is suspected, we ought to recommend a suspensory bandage, an horizontal posture, the cold bath, and the application of a solution of alum and other astringents. By a proper exhibition of these, the disease may at least be prevented from increasing, so as to render any operation unnecessary.

By *spermatocele* is understood a morbid distension of the vas deferens and epydydimis. The disease may arise from tumours, stricture, or inflammation about the vas deferens, or its termination in the penis; but more probably from inflammation there. When an inflammatory disposition is discovered, general and topical bloodletting, gentle laxatives, a low cooling diet, and rest of body, will commonly be found the best remedies. When tumours are found to press upon the vas deferens, they ought either to be brought to a state of suppuration, or entirely extirpated, if that can be properly effected. If the disease proceed from a venereal cause, nothing can be so useful as a course of mercury properly directed.

By *pneumatocele* is understood a distension of the scrotum from a collection of air. The principal cause of this disease, which rarely happens, is wounds in the lungs, by which air passes through the common cellular substance into the scrotum; but from whatever cause the tumour is produced, the disease is to be treated by making small punctures with the point of a lancet, as in the case of anasarcous swellings formed by water.

Testicle.

Sarcocele implies a fleshy, enlarged state of the testicle, much firmer and harder to the touch than is observed in hernia humeralis or inflamed testicle.

The symptoms vary exceedingly in different patients; but the following are the most general: The first symptom is commonly a small enlargement, without much pain, and no discoloration of the part. The tumour becomes gradually larger, and the hardness increases; but for a considerable time the surface remains smooth; and when the constitution is otherwise good, the disorder will sometimes remain in this situation for a considerable number of years; and in a few rare instances, by a moderate diet, keeping the belly open, suspending the tumour properly, and avoiding violent exercise, or any thing which may considerably increase the impetus of the blood, the disorder has not only been prevented from increasing, but has in a gradual manner disappeared entirely. More commonly, however, the tumour increases in size, and becomes ragged and unequal on its surface. Smart and severe shooting pains are frequently felt through its substance. Sometimes serum is extravasated in the vaginal coat, or matter is collected in different parts of the tumour. The scrotum, now much distended, bursts, and thin, fetid, bloody matter discharging, the disease terminates in an ulcerated cancer of the worst kind.

The spermatic cord is commonly unaffected till the tumour has acquired a considerable size, and generally not till collections of matter have been formed. After this, from being at first only slightly swelled, it gradually increases in hardness and bulk: after which it becomes very painful, knotty, or unequal through its whole extent. The discharge from the scrotum still continues; but although the matter increases in quantity, the size of the tumour is not thereby diminished, but, on the contrary, continually increases; the edges of the sore become hard, livid, and retorted, and fungous excrescences push out from every part of it; the health of the patient becomes entirely destroyed, and he is at last carried off in great misery.

If the disease has subsisted for a long time without considerably increasing in size, we may reasonably think it is of a milder nature than where it has made a rapid progress. As long as the testicle is only hard and free from the formation of matter, we may expect a favourable event; but where collections of matter have already formed, either in the substance or upon the surface of the testicle, there is no other chance of saving the patient than by means of extirpation. Previous to this, however, we are to attend to the state of the spermatic cord; for were any of it left in a diseased state, little advantage could be derived from extirpation; nor ought the operation ever to be performed but where we can reach the whole of the diseased parts. We are not to be prevented from performing it though the cord should be considerably enlarged, providing it do not evidently partake of the disease of the testicle; for the cord is generally somewhat enlarged in the diseased state of the testicle; but this enlargement is for the most part merely either a varicose state of the veins, or a watery disposition of the cellular substance.

But supposing no obstacle to the operation, the method of doing it may be this. The parts being previously shaved, the patient is to be laid upon a square table of about three feet four inches high, letting his legs hang down; which, as well as the rest of his body, must be held firm by assistants; or he may be laid across a bed in the same manner. Then with a knife the incision is to be begun above the rings of the abdominal muscles, that there may be room afterwards to secure the vessels; then carrying it through the membrana adiposa, it must be continued downward to the bottom of the scrotum. A firm, waxed, flat ligature, composed of small threads, is next, by means of a curved needle, to be passed round the spermatic cord, at least an inch above the diseased part, or as near the abdominal ring as possible; after which the vessels are to be secured by a running knot, and divided about a quarter or half an inch below the ligature. The cord and testicle are then to be removed from the surrounding parts by dissecting from above downwards, and no instrument is better for this purpose than the common scalpel. After the diseased parts are removed, the knot upon the cord must be slackened to discover the spermatic arteries and veins; both of which, by means of the tenaculum or a common forceps, are to be taken up. The ligature upon the spermatic cord is now to be left loose, so as to act as a tourniquet if a hæmorrhagy should ensue; nor is there more occasion for leaving the ligature tied than for leaving a tourniquet firmly applied to one of the extremities after amputation; besides, where patients have suffered such pain, as is sometimes mentioned by authors, it has been found to be owing to the tightness of the ligature rather than to any other cause. In dividing the ligatures of the blood-vessels at the extremities of the cord, they must be left of such a length without the wound as to be readily removed, however much the cord may retract in the time of the cure.

PART II.

DIVISION II.

HARD PARTS.

CHAPTER I. *Affections of the Capsular Ligaments of Joints.*
——— II. *White Swelling.*
——— III. *Affections of the Bones.*

CHAPTER I. *Affections of the Capsular Ligaments of Joints.*

Collections here may consist of serum, blood, or pus and synovia combined. They are most frequently met with in the joint of the knee, and may be produced either by internal or external causes. These kinds of collections may in general be distinguished from each other.

Watery effusions, commonly called dropsical swellings of the joints, arise chiefly in consequence of severe rheumatic complaints; and when the tumour is not very large, the fluctuation of the fluid may be felt by pressure. When a large effusion appears immediately after a violent bruise, it is probable that it consists chiefly of blood; but when it succeeds a violent sprain, attended with great pain, inflammation, and swelling, terminating in an effusion, there is every reason to think that the contained fluid consists of pus mixed with synovia.

Swellings of the joints are most apt to be confounded with collections in the bursæ mucosæ, or with matter effused in the adjacent cellular substance. From the first of these they are generally distinguished by the contained fluid passing readily from one side of the joint to the other, and from its being diffused over the whole of it; whereas, when it is contained in the bursæ, the tumour is confined to a particular part, and is seldom attended with much pain.

When such collections can safely be allowed to remain, the capsular ligament ought never to be opened, as they can often be removed by discutients. Even considerable collections arising from rheumatism may commonly be discussed by friction, fomenting the parts with warm vapour, keeping them constantly moist with saturnine solutions, covering them properly with flannel, and applying blisters. When these fail, supporting the part with a laced stocking, or with a roller, has frequently been of service. But whether a rheumatic tumour can be discussed or not, it ought not to be opened; for the inconvenience attending it is more intolerable than the pain and inflammation which may ensue. But when the matter would do mischief by lodging, it should be discharged. Effused blood and matter which succeed high degrees of inflammation are of this kind. Blood is frequently extravasated among soft parts without much detriment; but when in contact with cartilage or bone, it soon hurts them materially. The matter ought to be discharged so as most effectually to prevent the admission of air into the cavity of the joint. For this purpose the opening should be made with a trocar; and the skin, previously drawn tight to the upper part of the tumour, should be pulled down immediately on withdrawing the canula. A piece of adhesive plaster should be directly laid over the opening, and the whole joint should be firmly supported by a flannel roller properly applied. If the patient be plethoric, he should be blooded to such an extent as his strength will bear; he should be put upon a strict antiphlogistic regimen, and in every respect should be managed with caution; for inflammation being very apt to ensue, we cannot too much guard against it.

Joints are sometimes rendered painful and stiff by the formation of different substances within the capsular ligaments. These are sometimes loose, and as firm as cartilage; and sometimes of a soft membranous nature, similar to those already observed in treating of swellings of the bursæ mucosæ.

In some cases these substances, especially the last species, retain nearly the same situation, without being much affected either by pressure or by the motion of the joint: in that case the pain is constant, but seldom severe. The first species, however, is commonly very moveable; and on being touched they slip with such facility, that it is difficult to fix them even with the fingers. These are only painful in particular situations.

Where these concretions appear, upon examination, to be perfectly loose and detached, if the pain which they excite is very severe, we should venture in a cautious manner to take them out, by making an incision into the joint. But if there is reason to suspect that they are connected with any part of the joint, the patient ought to be advised to submit to the pain they induce, which in general will be rendered moderate by shunning exercise; but if, notwithstanding this, it becomes insupportable, amputation is the only resource.

The limb being firmly secured by assistants, in that posture which admits of the body to be taken out being felt most distinctly, the surgeon should endeavour to fix it with his fingers towards the upper part of the joint, after an assistant has drawn the skin as much as possible upwards from the part where the incision is to be made. The operator with a scalpel is now to make an incision through the teguments and capsular ligament, directly upon the substance itself, of such a size as will admit of its being easily taken out: which may be done either with the finger or with the end of a blunt probe. If it is found to be connected by any small filaments either to the capsular ligament or to the cartilages of the joint, they should be cautiously divided, either with a probe-pointed bistoury, or probe-pointed scissars, after drawing the substance itself as far out as it can be got. When more concretions than one are found, they should all be taken out at the same opening, when this can be done; but when it cannot, it will be better to allow the first incision to heal before attempting the second, so as to avoid as much as possible the exciting of inflammation.

After the concretion is removed, the skin should be immediately drawn over the wound in the capsular ligament; and the lips of the opening in the skin being laid together, they should be secured in this situation by pieces of adhesive plaster, so as to prevent the air from finding access to the cavity of the joint. Till the wound be completely healed, the patient should not only be confined to bed, but the limb should be kept as much as possible in one posture, and a strict antiphlogistic regimen should be preserved.

Spina bifida, which belongs to this chapter, is a tumour which sometimes appears upon the lower part of the spine in new-born children. A fluctuation is distinctly perceived in it, and the fluid it contains can in some measure be pressed in at an opening between the vertebræ. In some cases this opening is owing to a natural deficiency of bone; in others, to the separation of the spinous processes of the vertebræ.

The disease proceeds from serum collected within the coverings of the spinal marrow. It is always fatal. Children labouring under it have been known to live for two or three years; but in general they linger and die in a few weeks. All that art has been able to do is to support the tumour by gentle pressure with a proper bandage. When a tumour of this kind is laid open or bursts, the child dies in a few hours. A tumour nearly of the same nature with this is sometimes met with upon different parts of the head in new-born children; it is formed by a fluid lodged beneath the membranes of the brain, which have been forced out at some unossified part of the skull. All that has been observed of the former case is applicable to the present. Mr. Abernethy, in his remarks on lumbar abscess, has suggested that it may possibly be advantageous to discharge the fluid gradually by a valvular opening.

Chapter II. *White Swelling.*

Mr. B. Bell has divided this disease into two species, the rheumatic and the scrophulous. The first commences with an acute pain, seemingly diffused over the whole joint, and frequently extending along the tendinous aponeuroses of the muscles which communicate with it: the swelling is from the first uniform; there is a great tension, but seldom any external discoloration. These symptoms increase; the joint becomes œdematous, abscesses form in different parts, which whether laid open, or breaking of themselves, discharge considerable quantities of matter, but without much reducing the size of the swelling. In the mean time the health of the patient gradually declines from the violence of the pain, and the absorption of matter into the system; and if not saved by amputation or some other more fortunate plan, he at length sinks under the influence of night sweats or diarrhœa.

On dissecting the limb in this species, there is found a morbid thickening of the surrounding ligaments; and in the earlier stages of the disease, healthy synovia, and no affection of the bones or cartilages. But when, by a very long continuance of the disorder, the ligaments come to be corroded by the different collections of matter, the cartilages, and in consequence thereof the bones, soon begin to suffer. The tendons of the flexor muscles, though very stiff and contracted, do not, upon dissection, show any signs of disease.

The above is an history of the mildest species of white swelling; the more inveterate kind our author names the scrophulous white swelling. In this the pain is commonly very violent; more acute than in the former; and instead of being diffused, is confined to a particular spot, commonly the very middle of the joint. The swelling is commonly inconsiderable at first; insomuch that, on some occasions, even when the pain has been very violent, little difference in point of size could be observed between the diseased and the sound joint. The motion of the joint is attended with very great pain, and the tendons become stiff. As the disorder advances, the pain becomes more violent, and the swelling increases, with an evident enlargement of the ends of the bones. The same elastic feel, together with similar abscesses, occur in this as in the last: but upon opening them they commonly discharge a thin fetid stuff; the bones are found to be carious, and pieces of them are frequently discharged at the openings.

By the continuance of the disorder the constitution suffers, as in the first species of the disease: and a diarrhœa with night-sweats commencing, the patient is soon reduced to little more than skin and bone.

Upon such joints being dissected in the first stages of the disorder, the soft parts seem very little affected; but there is constantly observed an enlargement either of the whole ends of the bones, or of their epiphyses; frequently of those on one side of the joint only; in others, again, the bones on both sides have been affected.

This enlargement sometimes occurs without any other evident disease: but in general, and always in a more advanced state of the complaint, the soft spongy parts of such bones appear dissolved into a thin, fluid, fetid matter; and that too, in some cases, without the cartilages which surround them seeming much affected. In process of time the cartilages are likewise dissolved; and then the matter of the bones and softer parts mixing together, such swellings exhibit in that state a still more confused collection than is generally observed even in the worst stages of the other species of the disorder.

In the farther progress of this disease the surrounding soft parts likewise suffer. The ligaments become thickened, and the contiguous cellular membrane is stuffed with the viscid glairy matter observed in the other species of the disorder.

In the treatment of white swelling it should be observed that as the former species is at first evidently of an inflammatory nature, considerable advantages may be commonly obtained by a due attention to a proper cooling course. The first remedy which, with this view, should be put in practice, is blood-letting immediately from the part affected. Cupping and scarifying is here a principal remedy. The instrument should be applied to each side of the diseased joint; on each side of the rotula, for instance, when the knee is the part affected, and at least eight or ten ounces of blood discharged; and this to be repeated at proper intervals, once, twice, or oftener, according to the violence of the symptoms and state of the patient's strength at the time.

Cupping is, in these cases, much superior to leeches, because it is more expeditious, and because the swelling occasioned by the application of any considerable number of these animals proves frequently very troublesome, and sometimes interrupts for a time the use of other remedies.

Upon the anterior part of the joint, where the cupping-glasses have not been placed, a small blister should be directly applied, and the part kept open with issue ointment, till the wounds from the scarificator are so far healed that a vesicatory may likewise be laid on one side of the joint; and so soon as that is nearly healed, the other side should be also blistered. By thus alternately applying them, first to the one side and then to the other, almost a constant stimulus is kept up; which, in deep-seated inflammations, seems to have fully a greater influence than all the discharge occasioned by blisters. Gentle cooling laxatives at proper intervals are also of use; and the patient should, in every respect, be kept upon a strict antiphlogistic course, both as to diet and every other circumstance.

It is in the first stages only of the disease that such a course can be of much service; and in such it has frequently been a means of curing disorders which otherwise might have proceeded to the last stages of white swellings.

The original inflammatory affection being once over, these sort of drains seem to have little or no influence, and ought not then to be long persisted in, as they prevent the use of other remedies, which, in an advanced state of the disease, are commonly more efficacious.

The inflammation being mostly gone, and while there are yet no appearances of the formation of matter, mercury has sometimes been known of use; not given so as to salivate, but merely to affect the mouth gently, and to keep it somewhat sore for a few weeks.

The best form of using it is by way of unction, as it allows, at the same time, the application of friction; which, in all such swellings, may of itself be in some measure considered as a remedy. For this purpose, an ointment of quicksilver and hog's-lard should be prepared; but with so small a proportion of the former, that the patient may admit of two drams of the ointment being rubbed in three times a-day. In order to rub that quantity of the medicine in with gentle friction, an hour each time is at least necessary; for in the ordinary way of continuing friction for a few minutes only, it can seldom have much influence.

In the scrophulous white swellings, when the diseased parts of the bone begin to cast off, a cure may in that way, by assisting the efforts of nature, be sometimes obtained in the small joints; but in all the large joints, as the knee, ankle, &c. it is not probable that any other resource than amputation will ever afford much relief. And even the effects of that operation can seldom be depended on as lasting; for when the general scrophulous taint still subsists in the constitution, the disorder will most probably appear again in some other part; which, however, in the advanced stages of the disease, it is sometimes necessary to run the risk of, the pain being often so tormenting as to make it more eligible to submit to any hazard rather than to bear it longer.

When, however, for some reason or other, amputation is determined against, as there being almost a certainty of the complaint soon returning, from the scrophulous disposition appearing very strong in the system, it then becomes necessary to have recourse to palliatives, so as to render the complaint as tolerable as possible: and with this view, opiates in large doses, by moderating the pain and procuring rest to the patient, will in general be found the principal remedy. In other respects, all such medicines and articles of regimen as are found beneficial in scrophula may be had recourse to.

CHAPTER III. *Diseases of the Bones.*

The bones, as well as the softer parts, are liable to be swelled, either throughout their whole length, or to have tumours formed on particular parts of them.

Exostosis is one species of tumour of the bone. According to Mr. Bromefield, no swelling should be called so, but an excrescence continued from a bone, like a branch from the trunk of a tree. Under this head therefore is ranked the benign node, which may be produced by external injury, such as contusions and fractures: it can hardly be called a disease, as pain seldom succeeds, but rather a deformity.

There are risings or tumours observable on the bones which are often the consequents of venereal virus, and are termed tophi, gummi, or nodes.—Tophus is a soft tumour in the bone; and seems to be formed of a chalky substance, that is intermediate between the osseous fibres. These cretaceous extravasations are sometimes found on the ligaments and tendons, as well as on the bone; and may sometimes be taken out by the knife. We have many instances where chalk stones in gouty people make their way out through the skin of the fingers and toes.

Gummi is a soft tumour on the surface of the bone, between it and the periosteum; and its contents resemble gum softened, from which it has taken its name. Possibly, by obstruction in the nutrient vessels of the bone, a rupture of some of them occasions the serous liquors to escape, which, by making its way between the fibres of the bone, arrives at its surface; and being detained by the resistance of the periosteum, its most liquid parts being evaporated, and the remainder condensed by the inflammation, and consequently this inelastic covering being stretched, it becomes inspissated, and forms this species of exostosis, as it is generally called. When this is the cause, and the indisposition of the habit in general got the better of, pressure by a steel instrument, adapted to the part affected, is the proper cure.

The confirmed venereal node has the appearance of a divarication of the osseous fibres, probably from some inspissated humour obstructing the nutrient vessels, but not extravasated; this occasioning an extension of the periosteum, produces a violent pain, which, when nocturnal, is the characteristic of a venereal cause. When the periosteum is thickened but the bone not affected, a course of mercury, by attenuating the obstructed humour, and fitting it to be carried out of the body by the proper outlets, will often produce a perfect cure: but when the bone itself is diseased, this method will fail. But here the division of the extended periosteum has been known to give perfect ease.

The usual method, formerly, was to apply a caustic equal to the extent of the node, which being laid bare, required exfoliation before it could be cicatrized. If the incision is made early, that is, before matter be formed under the investing membrane, it seldom requires exfoliation; and, as we often find that the bone itself is not affected, but only the periosteum thickened, we may be deceived even after a careful examination: it is therefore proper that the patient should be pretty far advanced in a course of mercurial unction before even the incision is made; for, should the tumour decrease, and the pain abate during the course, chirurgical assistance, with the knife, most likely may become unnecessary.

A bone may become carious first in its internal parts; and that from external injury, as well as from a vitiated state of the animal fluids. Authors seem not to agree as to the technical term for this kind of disease of the bones; some calling it cancer or gangræna ossis; others, spina ventosa, from the pointed extuberances usually attendant on this disorder of the bone; and some again teredo, from the appearance of the carious bone, like wood that is worm-eaten.

It is universally allowed, that this disease takes its rise from matter being formed either in the diploe, or in the marrow: whenever obstruction is begun in the vessels expanded on, or terminating in, the medullary cysts, the consequence will be inflammation, and, if not early removed, matter will form; for this reason this case may be called abscessus in medulla. Whenever, then, a patient complains of dull heavy pain, deeply situated in the bone, possibly consequent to a violent blow received on the part some time before, though the integuments appear perfectly sound, and the bone itself not in the least injured, we have great reason to suspect an abscessus in the medulla. Children of a bad habit of body, though they have not suffered any external injury, will often become lame, and complain of the limb being remarkably heavy; and though not attended with acute pain, yet the dull throbbing uneasiness is constant. If rigours happen during the time the patient labours under this indisposition, it generally implies that matter will be formed within the substance of the bone. If the extremities of the bone complained of begin, or if it becomes enlarged throughout its whole extent, it may be known to be an abscessus in medulla, or true spina ventosa, as it is called: if neither of these symptoms take place, the great insensibility of the bone in some subjects will prevent that acuteness of pain usual in other parts where matter is formed, though the acrid matter is eroding the bone during the whole time it is contained within it. This matter at length having made its way through, arrives at the periosteum, where it creates most violent pain, as well from its sharpness as from its increased quantity, occasioning an extension of the periosteum. The integuments then become swelled and inflamed, and have a sort of emphysematous feel. On being examined by pressure, the tumour will sometimes be lessened, from part of the matter retiring into the bone: from this appearance to the touch, most likely the name of ventosa was added to the term spina. When we are assured of matter being under the periosteum, we cannot be too early in letting it out, as it will save a considerable deal of pain to the patient, though probably it may not be of any considerable advantage in respect to the carious bone; for, where the fluids in general are vitiated, no chance of cure can be expected from topical remedies; but where the constitution is mended, Nature will sometimes astonish us in her part, as the carious bone will be thrown off from the epiphyses, or the teredines will be filled up by the ossific matter that flows from the parts of the bone where some of the spinæ have come away.

If proper medicines are given, the children well supported, and the parts kept clean and dry, patience and perseverance will frequently give great credit to the surgeon. In case it should have been thought advisable to apply a trephine, to give free discharge to the matter, the washing it away, as well as the small crumblings of the carious bone, by means of detersive and drying injections, has been known to contribute greatly to the curing this kind of caries, after the habit of body in general had been mended.

Besides those above mentioned, the bones are liable to two opposite diseases; the one termed friabilitas, the other mollities; the former peculiar to adults, the latter more frequent in infants, though sometimes seen in adults, from a vitiated state of their juices.

The bones, when deprived of their cementing liquor, by passing through fire, become friable. From repeated salivations, and in old people, they have been rendered extremely brittle; insomuch that in many subjects they have been fractured merely from their weight and the action of the muscles: but in such cases this is not owing to the friability of the bones, but to the loss of substance, from the erosion of the bone by an acrimonious humour thrown on it; to which cause perhaps may be attributed the disease called rickets in children. The effects of scorbutic humour in rendering the bones soft, in many instances, have often been remarked.

By proper diet, gentle friction with coarse cloths, exercise, and cold bathing, rickety children will frequently get their constitution so much changed, as that, by the time they arrive at the age of twenty years, there shall not remain the least vestige of their former disease. The epiphyses are generally most affected in this species of the disorder. For want of early attention to invalids of this sort, we find that their bones are not only become soft, and yield to the powers of the muscles, but remain distorted the rest of their lives, though they have acquired a perfect degree of solidity. In such cases, correcting the vitiated juices only will not restore the bones to their natural state; therefore the assistance of a skilful mechanic is necessary both to support the parts improperly acted on, and to alter the line of direction of the distorted osseous fibres.

Though the curvature of the extremities, or thickness of the ends of the bones near their articulations, may give the first alarm to those who are constantly with children, yet there are other symptoms that give earlier notice than these; and had they been timely discovered by proper judges, it is highly probable that the curvature of the limbs in many children might not have happened. The belly generally becomes larger in this disease, from the increased size of the contained bowels, as it is not unlikely but that the mesenteric glands are the first parts obstructed; obstructions of the liver, spleen, and pancreas, soon follow; the head then becomes enlarged; then a difficulty of breathing, which is generally supposed to be the effects of taking cold, succeeds; the sternum is elevated and sharp, and the thorax becomes contracted; the spine is protruded in several parts; the pelvis altered, according to the pressure of the parts within, and habitual inclination of the patient, at times, to obtain that line of direction in which the perpendicular from the centre of gravity may fall within the common base of the body, the extremities of the cylindrical bones, and the ends of the ribs next the sternum, become enlarged; soon after this the bones in general become soft and flexible, yielding in such directions as the strongest muscles determine by their actions.

The bones of children who die of this disorder, we observe, are not only rendered soft, but the vessels within their substance are replete with blood of a texture totally broken, and having more the appearance of thin chocolate than blood: the periosteum in many places is separated, and the intermediate space between it and the bone filled with extravasated fluid; and caries is almost as frequent as the separation of the periosteum. The muscles in such bodies generally appear pale and flabby.

Where the affection of the mesenteric glands is evident, calomel ought chiefly to be depended upon, given as an alterative in small quantities. When the belly begins to soften and subside, the chyle passes without interruption, and the child begins to get flesh; then the cold bath becomes truly serviceable, and the decoction or cold infusion of the Peruvian bark is a proper restorative; but the cold bath used too early, or the bark given before there is a free circulation of chyle through the lacteals, would be very injurious.

The mollities ossium, in some cases, may be produced from a redundancy of the oleaginous parts of the blood, or from a laxity of the solids, by which the fluids are not sufficiently attenuated, nor properly blended and mixed: the consequence of which will be obstructed perspiration, the habit in general loaded with gross, phlegmatic, and serous humours, and the ossific matter not united or condensed as in an healthy state. The method of cure confirms us in the cause of these symptoms; for, by strengthening the fibrous system, by using gentle exercise, a dry diet, good air, aromatics, and cold bathing, this kind of invalids are generally restored to health.

SU'RGY. *a.* (from *surge.*) Rising in billows.

SURIANA, in botany, a genus of the class decandria, order pentagynia. Calyx five-leaved; petals five; styles inserted into the inner side of the germs; seeds five, naked: one species only, a native of South America.

SURINAM, a country of Guiana, extending 75 miles along a river of the same name. It abounds with game, and singular animals of different kinds; the toad, in particular, being remarkable for its enormous size and ugly form. It produces fruits, indigo, sugar, cotton, tobacco, gums, and wood for dying. The woods are full of monkeys, and it is said there are serpents 30 feet long. This country was ceded by the English to the Dutch, for the province of New York, in 1674. It was taken again by the English in August 1799. The capital is Paramaribo.

SURINGIA, a commercial town of Japan, in the island of Niphon, capital of a province of the same name, with a castle, where the emperors formerly resided. Lon. 139. 5 E. Lat. 39. 30 N.

SU'RLILY. *ad.* (from *surly.*) In a surly manner.

SU'RLINESS. *s.* (from *surly.*) Gloomy moroseness; sour anger (*Dryden*).

SU'RLING. *s.* (from *surly.*) A sour morose fellow: not used (*Camden*).

SU'RLY. *a.* (from ꞅuꞃ, sour, Sax.) Gloomily morose; rough; uncivil; sour; silently angry (*Swift*).

To SU'RMISE. *v. a.* (*surmise*, Fr.) To suspect; to imagine imperfectly; to imagine without certain knowledge (*Hooker*).

Su'rmise. *s.* (*surmise*, French.) Imperfect notion; suspicion (*Hooker*).

To SURMOU'NT. *v. a.* (*surmonter*, Fr.) 1. To rise above (*Raleigh*). 2. To conquer; to overcome (*Hayward*). 3. To surpass; to exceed (*Milton*).

SURMOU'NTABLE. *a.* (from *surmount.*) Conquerable; superable.

SURMOU'NTER. *s.* (from *surmount.*) One that rises above another.

SURMULLET, in ichthyology. See Mullus.

SURNAME, that which is added to the proper name for distinguishing persons and families. It was originally distinguished from *sirname*, which denotes the name of the sire or progenitor: thus Macdonald, Robertson, are sirnames expressing the son of Donald, the son of Robert. The word *surname*, again, signified some name superadded to the proper name to distinguish the individual, as Artaxerxes *Longimanus*, Harold *Harefoot*, Malcolm *Canmore*. From this it is evident that every sirname was a surname, though the reverse was not so. In modern times they are confounded; and as there is now no occasion to preserve the distinction, Dr. Johnson has rejected the word sirname altogether. See NAME.

Surnames were introduced among all nations at an early period, and seem to have been formed at first by adding the name of the father to that of the son. This was the practice among the Hebrews, as appears from the scriptures. Caleb is denominated the son of Jephunneh, and Joshua the son of Nun. That the same thing was customary among the Greeks, every one who has read the poems of Homer must remember. We have an instance of it in the very first line of the Iliad: Αχιλληος Πηληιαδεω, "Achilles the son of Peleus." This is perhaps the general origin of surnames, for it has been common among most nations. This might be supported by examples borrowed from many nations. The old Normans used *Fitz*, from *filius*, which signifies son; as Fitzherbert, the son of Herbert. The Irish used *O*; as O'Neal, the son of Neal. The Scotch Highlanders employed *Mac*; as Macdonald, the son of Donald. The Saxons added the word *Son* to the end of the father's name; as Williamson.

The Romans generally had three names. The first called *prænomen* answered to our christian name, and was intended to distinguish the individuals of the same family; the second called *nomen* corresponded to the word *clan* in Scotland, and was given to all those who were sprung from the same stock; the third called *cognomen* expressed the particular branch of the tribe or clan from which an individual was sprung. Thus Publius Cornelius Scipio, *Publius* corresponded to our names John, Robert, William; *Cornelius* was the name of the clan or tribe, as Campbell was formerly the name of all the duke of Argyle's clients, and Douglas the name of the retainers of the duke of Hamilton's progenitors. *Scipio* being added, conveyed this information, that Publius, who was of the tribe of the Cornelii, was of the family of the Scipios, one of the branches or families into which that tribe was divided. Respecting the three names which were common among the Romans, we may say that the first was a name, and the other two surnames.

Du Chesne observes, that surnames were unknown in France before the year 987, when the lords began to assume the names of their demesnes. Camden relates, that they were first taken up in England, a little before the conquest, under king Edward the confessor: but he adds, they were never fully established among the common people till the time of Edward II.; till then they varied with the father's name; if the father, e. gr. was called *Richard*, or *Roger*, the son was called *Richardson*, or *Hodgson*; but from that time they were settled, some say, by act of parliament. The oldest surnames are those we find in Doomsday-Book, most of them taken from places, with the addition of *de*; as Godefridus *de* Mannevilla, Walterus *de* Vernon, Robert *de* Oyly, &c. Others from their fathers, with *filius*, as Gulielmus *filius* Osberni; others from their offices, as Eudo *Dapifer*, Gulielmus *Camerarius*, Gislebertus *Cocus*, &c. But the inferior people are noted simply by their christian names, without any surnames at all.

They seem to have been introduced into Scotland in the time of William the conqueror by the English who accompanied Edgar Atheling when he fled into that kingdom These had their proper surnames, as Moubray, Lovell, Lisle, using the particle *de* before them; which makes it probable that these surnames had been derived from the lands which their ancestors or they themselves had possessed. In Kenneth II.'s time in 800 the great men had indeed begun to call their lands by their own names; but the ordinary distinctions then used were only personal, and did not descend to succeeding generations, such as those employed by the Hebrews and Greeks: for example, *John the son of William*; or the names of office, as Stewart; or accidental distinctions from complexion or station, as Black, White, Long, Short; or the names of their trade, as Taylor, Weaver.

It was long before any surnames were used in Wales, except that of son, as Evan ap Rice, Evan the son of Rice; Evan ap Howel, Evan the son of Howel; but many of them have at length formed separate surnames, as the English and Scots, by leaving out the *a* in *ap*, and joining the *p* to the father's name: thus Evan ap Rice becomes Evan Price; Evan ap Howel, Evan Powel.—We are told surnames were unknown in Sweden till the year 1514, and that the common people of that country use none to this day; and that the same is the case with the vulgar Irish, Poles, and Bohemians.

When we come to enquire into the etymology of surnames, we must allow that many of them were originally significant of the qualities of mind, as Bold, Hardy, Meek; some of the qualities of body, as Strong, Low, Short; others expressive of the trade or profession followed by the persons to whom they were applied, as Baker, Smith, Wright, Butler, Page, Marshal. But the greatest number, at least of the ancient surnames, were borrowed from the names of places. Camden says, that there is not a village in Normandy but has given its name to some family in England. He mentions as examples, Percy, Devereux, Tankervil, Mortimer, Warren, &c. They were introduced with William the conqueror. Several have been derived from places in the Netherlands, as Gaunt, Tournay, Grandison; and many from the names of towns and villages in England and Scotland, as Wentworth, Markham, Murray, Aberdeen. Many have been formed from the names of animals, as quadrupeds, birds, fishes; from vegetables, and parts of vegetables, as trees, shrubs, flowers, and fruits; from minerals of different kinds. Others are formed from such a variety of accidents that it is impossible to particularize them.

Dr. Wallis has an interesting dissertation on surnames, which may be seen in Greenwood's Grammar.

To Su'rname. *v. a.* (*surnommer*, French.) To name by an appellation added to the original name (*Milton*).

To SURPA'SS. *v. n.* (*surpasser*, French.) To excel; to exceed; to go beyond in excellence (*Shakspeare*).

SURPA'SSABLE. *a.* (from *surpass* and *able.*) That may be excelled.

SURPA'SSING. *part. a.* (from *surpass.*) Excellent in a high degree (*Calamy*).

SURPLICE, the habit of the officiating clergy in the church of England. By Can. 58. every minister saying the public prayers, or ministering the sacrament or other rites of the church, shall wear a decent and comely surplice with sleeves, to be provided at the charge of the parish. But by 1 Eliz. c. 2. and 13 and 14 Car. II. the garb prescribed by act of parliament in the second year of king Edward VI. is enjoined; and this requires that in the saying or singing of matins and even songs, baptizing and burying, the minister in parish churches and chapels shall use a surplice. And in all cathedral churches and colleges, the archdeacon, dean, provosts, masters, prebendaries, and fellows, being graduates, may use in the choir, besides their surplices, such hoods as pertain to their several degrees. But in all other places every minister shall be at liberty to use a surplice or not. And hence in marrying, churching of women, and other offices not specified in this rubric, and even in the administration of the holy communion, it seems that a surplice is not necessary. Indeed for the holy communion the rubric appoints a white alb plain, which differs from the surplice in being close-sleeved, with a vestment or cope.

SU'RPLUS. Su'rplusage. *s.* (*sur* and *plus*, French.) A supernumerary part; overplus; what remains when use is satisfied (*Boyle*).

SURPRI'SAL. Surpri'se. *s.* (*surprise*, French.) 1. The act of taking unawares; the state of being taken unawares (*Wotton*). 2. Sudden confusion or perplexity.

To SURPRI'SE. *v. a.* (*surpris*, French.) 1. To take unawares; to fall upon unexpectedly (*Ben Jonson*). 2. To astonish by something wonderful (*L'Estrange*). 3. To confuse or perplex by something sudden (*Milton*).

SURPRI'SING. *part. a.* Wonderful; raising sudden wonder or concern (*Addison*).

SURPRI'SINGLY. *ad.* (from *surprising.*) To a degree that raises wonder; in a manner that raises wonder (*Addison*).

SU'RQUEDRY. *s.* Overweening pride (*Spenser*).

SURREBU'TTER. *s.* (In law.) A second rebutter; answer to a rebutter.

SURREJOI'NDER. *s.* (In law.) A second defence of the plaintiff's action, opposite to the rejoinder of the defendant (*Bailey*).

To SURRE'NDER. *v. a.* (*surrendre*, old. Fr.) 1. To yield up; to deliver up (*Hooker*). 2. To deliver up an enemy (*Fairfax*).

To Surre'nder. *v. n.* To yield; to give one's self up (*Glanville*).

Surrender, in common law, a deed or instrument testifying that the particular tenant of lands and tenements, for life or years, doth sufficiently consent and agree, that he who has the next or immediate remainder or reversion thereof, shall have the present estate of the same in possession; and that he hereby yields and gives up the same to him, so that the estate for life or years may merge or drown by mutual agreement of the parties. Of surrenders there are three kinds; a surrender properly taken at common law; a surrender of copyhold or customary estates; and a surrender improperly taken, as of a deed, a patent, &c. The first is the usual surrender, and it is usually divided into that in deed, and that in law.

Surrender, in deed, is that which is really made by express words in writing, where the words of the lessee to the lessor prove a sufficient assent to surrender his estate back again.

Surrender, in law, is that wrought by operation of the law, and which is not actual. —As if a man have a lease of a farm for life or years, and during the term he accepts a new lease; this act is, in law, a surrender of the former.

Surrender of a bankrupt. See Commission of bankruptcy.

Surrender of copyholds, is the yielding up of the estate by the tenant into the hands of the lord, for such purposes as are expressed in the surrender; as to the use and behoof of A and his heirs, to the use of his own will, and the like. This method of conveyance is so essential to the nature of a copyhold estate, that it cannot possibly be transferred by any other assurance.

SURRE'PTION. *s.* (*surreptus*, Latin.) Sudden and unperceived invasion or intrusion (*Hammond*).

SURREPTI'TIOUS. *a.* (*surreptitius*, Lat.) Done by stealth; gotten or produced fraudulently (*Brown*).

SURREPTI'TIOUSLY. *ad.* By stealth; fraudulently (*Gov. of Tongue*).

To SU'RROGATE. *v. a.* (*surrogo*, Latin.) To put into the place of another.

Su'rrogate. *s.* (*surrogatus*, Latin.) A deputy; a delegate; the deputy of an ecclesiastical judge.

SURROGA'TION. *s.* (*surrogatio*, Latin.) The act of putting in another's place.

To SURROU'ND. *v. a.* (*surrondre*, Fr.) To environ; to encompass; to enclose on all sides (*Milton*).

SURRY, a county of England, 37 miles long and 27 broad; bounded on the N. by Middlesex, on the E. by Kent, on the S. by Sussex, and on the W. by Hampshire and

Berks. It lies in the diocese of Winchester; contains 519,040 acres, is divided into 13 hundreds, 11 market-towns (including Southwark), and 140 parishes; and sends 14 members to parliament. The air is generally temperate and healthy. The soil is very different in the extreme parts from that in the middle, whence it has been compared to a coarse cloth with a fine border: for the edge of the country on all sides has a rich soil, extremely fruitful in corn and grass, particularly on the N. and W. toward the Thames; but it is far otherwise in the heart of the county, where are wide tracts of sandy ground and barren heath, and in some places long ridges of hills. It produces corn, boxwood, walnuts, hops, and fullers-earth. The principal rivers beside the Thames (which is the boundary of this county on the N.) are the Mole, Wey, and Wandle. The lent assizes are held at Kingston, and the summer assizes at Guilford and Croydon alternately.

SURSOLID, or SURDESOLID, in arithmetic, the 5th power of a number, considered as a root. The number 2, for instance, considered as a root, produces the powers thus:

$2 = 2$ the root or 1st power,
$2 \times 2 = 4$ the square or 2d power,
$2 \times 4 = 8$ the cube or 3d power,
$2 \times 8 = 16$ the biquadratic or 4th power,
$2 \times 16 = 32$ the sursolid or 5th power.

SURSOLID PROBLEM, is that which cannot be resolved but by curves of a higher kind than the conic sections.

SURTO'UT. *s.* (French.) A large coat worn over all the rest (*Prior*).

To SURVE'NE. *v. a.* (*survenir*, French.) To supervene; to come as an addition (*Harvey*).

To SURVE'Y. *v. a.* (*surveoir*, old French.) 1. To overlook; to have under the view; to view as from a higher place (*Denham*). 2. To oversee as one in authority. 3. To view as examining (*Dryden*). 4. To measure and estimate land.

SURVE'Y. *s.* (from the verb.) 1. View; prospect (*Dryden*). 2. Superintendance. 3. Mensuration.

SURVEYING, the art, or act, of measuring land. This comprises the three following parts; viz. taking the dimensions of any tract or piece of ground; the delineating or laying the same down in a map or draught; and finding the superficial content or area of the same; beside the dividing and laying out of lands.

The first of these is what is properly called surveying; the second is called plotting, or protracting, or mapping; and the third casting up, or computing the contents.

The first again consists of two parts, the making of observations for the angles, and the taking of lineal measures for the distances.

The former of these is performed by some of the following instruments; the theodolite, circumferentor, semicircle, plain-table, or compass, or even by the chain itself: the latter is performed by means either of the chain, or the perambulator. The description and manner of using each of these, see under its respective article or name.

As for the practice of surveying, it cannot sufficiently be taught by any directions that could be given in such compass as might with propriety be allowed to this article. We refer the reader who wishes to learn either the theory or the art, to the treatise on Surveying in Dr. Hutton's Mensuration, or to the work of Mr. Benjamin Talbot, on the same subject. Other very respectable treatises have been published by Love, Leadbetter, Wilson, Crocker, and Stephenson.

SURVEY'OR. *s.* (from *survey.*) 1. An overseer; one placed to superintend others (*Bacon*). 2. A measurer of land (*Arbuthnot*).

SURVEY'ORSHIP. *s.* (from *surveyor.*) The office of a surveyor.

To SURVI'EW. *v. a.* (*surveoir*, old Fr.) To overlook; to have in view (*Spenser*).

To SURVI'VE. *v. n.* (*supervivo*, Latin.) 1. To live after the death of another (*Denham*). 2. To live after any thing (*Watts*). 3. To remain alive (*Pope*).

To SURVI'VE. *v. a.* To outlive.

SURVI'VER. *s.* (from *survive.*) One who outlives another (*Swift*).

SURVI'VERSHIP. *s.* (from *surviver.*) The state of outliving another (*Ayliffe*).

SURVIVORSHIP, the doctrine of reversionary payments that depend upon certain contingencies, or contingent circumstances.

Payments which are not to be made till some future period are termed reversions, to distinguish them from payments that are to be made immediately.

Reversions are either certain or contingent. Of the former sort, are all sums or annuities, payable certainly or absolutely at the expiration of any terms, or on the extinction of any lives. And of the latter sort, are all such reversions as depend on any contingency; and particularly the survivorship of any lives beyond or after other lives. An account of the former may be found under the articles ASSURANCE, ANNUITIES, and LIFE-ANNUITIES. But the latter form the most intricate and difficult part of the doctrine of reversions and life-annuities; and the books in which this subject is treated most at large, and at the same time with the most precision, are Mr. Simpson's Select Exercises; Dr. Price's Reversionary Payments; Mr. Morgan's Annuities and Assurances on Lives and Survivorships; and more especially the valuable treatise on Life Annuities, &c. by Mr. Francis Baily; in which the whole subject is treated more perspicuously, scientifically, and correctly, than in any other work we have seen.

SURYA, the orb of the sun, personified and adored by a sect of Hindus as a god. He seems to be the same divinity with the Phœbus of Greece and Rome; and the sect who pay him particular adoration are called Sauras. Their poets and painters describe his car as drawn by seven green horses, preceded by Arun, or the dawn; who acts as his charioteer, and followed by thousands of genii worshipping him and modulating his praises. He has a multitude of names, and among them twelve epithets or titles, which denote his distinct powers in each of the twelve months; and he is believed to have descended frequently from his car in a human shape, and to have left a race on earth, who are equally renowned in the Indian stories with the Heliadai of Greece: it is very singular, that his two sons called Aswinau or Aswinicumarau, in the dual, should be considered as twin-brothers, and painted like Castor and Pollux; but they have each the character of Æsculapius among the gods, and are believed to have been born of a nymph, who, in the form of a mare, was impregnated with sun-beams.

SUS. Swine. In zoology, a genus of the class mammalia, order belluæ. Fore-teeth, upper four, convergent; lower (usually) six, prominent; tusks upper, two, shorter; lower two, standing out; snout prominent, truncate, moveable; feet (mostly) cloven.

These dig in the earth with the snout, which is furnished at the end with a strong, roundish cartilage; feed indifferently upon almost every thing, even the most filthy; wallow in the mire, and are extremely prolific. Six species, as follow:

1. S. scrofa. Hog. Back bristly on the forepart; tail hairy. Two varieties.
   - α. Tail hairy; ears short, roundish; being the wild hog.
   - β. Tail hairy; ears long, acute; being the common hog: which is again subdivided, as having
   - a. Hoofs undivided.
   - b. Back nakedish, belly reaching almost to the ground. This is the Chinese hog of Pennant and of various other zoologists.

Of the tame hog white is the most general colour; but other colours are often intermixed in various proportions. The wild boar of Europe, merely a variety of the same species, has under his bristles a covering of soft, short, curled hair. His ears are short, and somewhat rounded. He is of a dark, brinded colour. The Siam hog is another variety, distinguished from these merely by the greater length of its tail.

In some respects the hog seems to form an intermediate link between the whole and the cloven-footed animals; in others he seems to occupy the same rank between the cloven-footed and the digitated. Destitute of horns; furnished with teeth in both jaws; with only one stomach; incapable of ruminating; and producing at one birth a numerous progeny: the union of these faculties confers on the hog a remarkable peculiarity of character. He does not, like other animals, shed his fore-teeth, and shoot out a second set, but retains his first set through life.

Hogs enjoy none of the powers of sensation in eminent perfection. They indeed hear distant sounds; and the wild boar distinguishes the scent of the hunter and his dogs, long before they can approach him. But so imperfect is their feeling, that they sometimes suffer mice to burrow in the fat of their backs, without discovering any uneasiness, or even appearing sensible of the intrusion. In their taste they shew a singular degree of caprice. In the choice of herbs they are more delicate than any other herbivorous animal; yet devour the most nauseous and putrid carrion, with more indiscriminate voracity than any beast of prey. Nay, at times, they scruple not to gorge their appetite with the living limbs of their own young: and though their ferocity and courage are seldom to be feared, yet even the domestic hog has been often known to mangle infants, out of desperate voracity. The hog is remarkable for the smallness of his eyes: whence a person whose eyes are very diminutive, and deep sunk in his head, is proverbially said to be pig-eyed. The form of the hog is inelegant; and his carriage is equally mean as his manners. His unwieldly shape renders him no less incapable of swiftness and sprightliness than he is of gracefulness of motion. His appearance is always drowsy and stupid. He delights to bask in the sun, and to wallow in the mire. His grunting voice is well known. An approaching storm seems to affect his feelings in a singular manner. On such an occasion, he runs about in a frantic state, and utters loud shrieks of horror.

The wild boar is a nobler animal than our domestic hog. His senses are more acute, his manners more dignified, his courage and activity greatly superior. When young, these associate in herds: after attaining their full growth, the individuals become less diffident of their own strength, and keep less carefully together. But many of the old still continue to associate with the young; and when danger approaches, as they are the ablest, so they are the first to face it. The wild sow is peaceful, except when her young are injured. Parental fondness then prompts her to the most desperate fury in their defence. The wild boar is never formidable, till roused and provoked. He is frequently an object of the chace. He retreats slowly before the dogs; diffusing, as he flees, a strong odour, by which his path is easily traced. Dogs find it dangerous to follow too fast. He turns and defends himself with resolute valour, inflicting often severe, and sometimes mortal wounds on his pursuers. A young wild boar, being swifter and more timid than the old, is not easily hunted down. These animals are sometimes taken by surprise, as well as by the open and more generous arts of the chace. The snout of the wild boar is esteemed a luxurious dish. The young of the wild boar have been sometimes taken and castrated; and after that, dismissed into the woods, in order to grow up and fatten.

Roots and fruits are the principal food of both the wild and the domestic variety of this species. They eat grains very willingly; and a proportion of salt mixed with their food contributes to fatten hogs, as well as other animals. In Scotland, potatoes, which are raised in such abundance, and form so considerable a part of the sustenance of the poor, are also administered in great plenty to gratify the voracity of the hog, and seem to be an article of food excellently adapted to his constitution. The snouts of these animals are formed for digging in the ground, and nature has taught them to employ them in this manner. Tame hogs are often very troublesome in cultivated grounds; ploughing them up with their snouts, and thus entirely frustrating the labours of the cultivator. Worms, the wild carrot, and other roots, are the objects of their search. The wild boar, having a longer and stronger snout than the domestic, digs deeper, and continues his furrow nearly in a straight line. The inhabitants of America find the hog very beneficial in clearing their lands of rattle-snakes and other serpents, to whom he is a constant enemy, and whom he devours without suffering injury.

These animals are fit for procreation at the age of nine, or at most, of twelve months. The sow admits the boar at almost all seasons. She brings forth in the beginning of the fifth month after conception; and, as the suckling of their young does not hinder her from soliciting the embraces of the male in a short time, she often produces two litters in the course of the year. She generally brings a numerous progeny at a birth; her first litter is less numerous than those which follow. She bears often not fewer than twenty pigs at once; and is furnished with a number of paps to suckle them. Many of the pigs are killed young. A considerable number of the males, which are preserved to be brought up, are castrated at the age of six months, or earlier. These animals, when suffered to see the natural term of life, live from fifteen to five and twenty, or thirty years. Their size and strength continue to improve till the fifth or six year. They are infested by lice, and afflicted by scurvy, scab, and scrophula.

Almost every region of the globe possesses animals of this species, either in a tame or in a wild state. They are indeed found to be incapable of subsisting in Kamtschatka, and the frigid zones, where the cold is too intense for their constitutions. Wild hogs abound through all Europe, except in the British isles, and the countries north of the Baltic. They are equally diffused through Asia, from Syria to the borders of the lake Baikal; and in Africa, on the coast of Barbary. They abound in the Oriental isles, Ceylon, Celebes, and Java. They were not originally natives of America; but, being introduced by the European settlers, they have multiplied in the warmer climates of that hemisphere to an astonishing degree. Vast droves of wild hogs inhabit the forests of South America; which appear to be merely the descendants of those originally introduced from Europe, relapsed, in the course of time, into a state of nature.

Contemptible as he may appear, the hog is, in a very considerable degree, beneficial to mankind. His flesh is a pleasant, substantial, and not unwholesome article of food. It affords numberless materials to the table of the epicure; and among others, brawn, a preparation peculiar to England. The paps of a fat, pregnant sow, newly cut off, was a dish in high reputation among the luxurious eaters of ancient Rome. Pork is always an important article among naval stores. It takes salt better than the flesh of any other animal; and is, of consequence, preserved longer. The lard of the hog is employed in various medical preparations, and is compounded by the perfumer into pomatums. The bristles are made into brushes, and of great benefit to the shoemaker. The skin is worked into coverings for pocket-books, saddles, and a multitude of other articles.

The Chinese hog is distinguished from the common by having the upper part of its body almost bare, its belly hanging nearly to the ground, short legs, and a tail still more disproportionately short. This variety is also of a smaller size; and its flesh is whiter and more delicate. The colour is commonly a dark grey. It abounds in China, and is diffused through New Guinea, and many islands of the South Sea. The New Hebrides, the Marquesas, the Friendly, and the Society isles possess this animal; and the inhabitants of these islands cultivate it with care, as it is almost the only domestic animal they can boast of. The Chinese hog is found likewise in Batavia, Sumatra, and other Oriental islands. The Sumatran name is babee.

In the islands of the South Sea, the hog, being the principal quadruped, is more carefully cultivated than among us. Bread-fruit, either in the natural state, or made into sour paste, yams, eddoes, and other vegetables, are the food on which it is nourished. Such a choice of nutriment renders the flesh juicy and delicious; and the fat not less rich nor less agreeable to the taste than the best butter. The Otaheitans, and the inhabitants of the other islands in the southern seas, in which these animals are found, often present roasted hogs at their morais, as acceptable offerings to the deities whom they worship; covering the offering with a piece of fine cloth, and leaving it to decay near the sacred place.

We are not only ignorant concerning the original introduction of hogs, but of inhabitants of every kind, into those islands. Yet it has been conjectured, that the former may have proceeded from the continent of the East, and penetrated, by degrees, from island to island, till they at length advanced so far as the Marquesas.

2. S. tajassu. Pecari or Mexican hog. Back with a glandular orifice; tailless. In size and figure, this animal bears an imperfect resemblance to the hog of China. Its body is about three feet in length; the head less tapering and wedge-like than in the common hog; ears are short, erect, and pointed; eyes neither sunk nor prominent; bristles covering its body, longer and more stiff than those of the former species. They resemble indeed rather the quills of the porcupine than the bristles of the hog. On the neck and back they are longer than on the sides. The belly is almost entirely bare. A band of white extends between the shoulders

and the breast. From the gland on the back constantly distils a wheyish, fetid liquor, which is the most remarkable peculiarity of this species. The first Europeans who became acquainted with this animal fancied this gland the navel, preposterously disposed by nature on the back, instead of on the belly.

The manners of the Mexican hog are not very different from those of Asia and Europe. Mexico, and all the warm climates of South America, possess numerous herds of this species. Their instincts, and arms for offence and defence, are the same as those of our own hog. They seem more gregarious in their dispositions. They are generally found associating together in parties. Though only an individual be singled out, the whole body join with generous valour against an enemy. They grunt with a stronger and harsher voice than the hogs of Asia or Europe; but are scarce ever prompted by either fear or rage to squeak in the same wild tone. Forests are their favourite haunts; they resort not, like our domestic hog or wild boar, to marshes and mires. Fruits, seeds, and roots, are their chief food: they eat also serpents, toads, and lizards; and display great dexterity in tearing off the skins of those reptiles with their feet; but they do not wallow nor become fat like the common hog.

Their economy has not been very minutely studied by naturalists. A number of young ones are produced at a birth; and the mother treats them with the tenderness and solicitous care of a parent. Although existing chiefly in a wild state, they are susceptible of domestication; but no pains can overcome their natural stupidity and indocility. The beasts of prey, not less than man, are hostile to this species. The American leopard, or jaguar, one of their most formidable enemies, often falls amid a herd, after destroying the greatest part of them, weary with slaughter, and rather exhausted by his own exertions than overcome by theirs. If killed in full health, the flesh of this animal is agreeable food; provided the gland on the back be cut off, and the liquor which it secretes carefully washed from the carcase at the instant of death.

3. S. Æthiopicus. Ethiopian hog. Fore-toothless; under the eyes a soft, wrinkled pouch. This animal has a longer body and shorter legs than our common swine. It is near five feet long, and between two feet and a half in height; body thick and broad; snout almost of a corneous consistency, truncated and depressed; mouth narrow, as well as destitute of fore-teeth, but furnished with uncommonly hard gums to supply their functions; tusks in the lower jaw small, in the upper very large; eyes small, and situated high in the forehead, the horizontal lobe or wattle under them intercepting from the sight of the animal all objects placed immediately below. The skin of a dusky hue; the bristles thinly dispersed in separate parcels over the body, between the ears and on the shoulders longer than on any other parts.

These animals inhabit the hottest regions of Africa; they are diffused from Sierra Leone to Congo, and are also found in the adjacent island of Madagascar.

The manners and œconomy of these animals are but imperfectly known. They live chiefly under ground, where the texture of their snout enables them to make their way as readily as the mole. They are lively, swift, fierce, and cunning. At the Hague, one of them gave his keeper a fatal wound in the thigh. They disdain all commerce with the Chinese, or with our European domestic hog. In appearance they are very hideous.

4. S. Africanus. Cape hog. Fore-teeth two, in the upper jaw. This hog is of a superior size, and peculiar to Africa. The species are diffused through the tract of country between Cape Verd and the Cape of Good Hope. The head is long; the snout slender; tusks large, hard as ivory, and in the upper jaw thick and truncated obliquely; ears narrow, erect, and pointed; tail slender, and terminating in a tuft reaching down to the highest joint of the leg; either jaw furnished with twelve grinding teeth; body covered all over with long, fine bristles. This species has been by some naturalists confounded with that immediately preceding; but the form of the head, the structure of the mouth, and the manner in which the body is covered, establish a sufficient distinction between them.

5. S. babyrussa. Babyrussa. Two crooked tusks piercing through the upper part of the face. The babyrussa is of a plump, square form, and nearly equal to the stag in size; but it is chiefly distinguished by its tusks. Those in the inferior jaw rise eight inches out of their sockets towards the eyes. The sockets of those above are placed on the outside of the jaw, and the tusks rise twelve inches out of them; they bend like horns, till their points nearly touch the forehead. The ears are small, erect, and pointed. A few weak bristles cover the back; the rest of the body being invested with a sort of soft wool: tail long, often twisted, and terminating in a point.

The babyrussa is found in the islands of Java, Celebes, and Boero in the East. A few individuals are often diffused through the other islands of the Indian Ocean. This species is naturally gregarious. Their sense of smelling is extremely acute. Plants and leaves of trees are their favourite food. They grunt like the common hog, but are not unsusceptible of domestication. To escape from a pursuer, they often rush into the sea and swim to a distance, or conceal themselves by diving. They even swim occasionally from isle to isle. A babyrussa is not unfrequently seen to rest its head in a forest by hooking its upper tusks on some bough. None of these animals ever commit any devastations in gardens.

6. S. porcus. Guinea hog. Back prickly on the hind-parts; tail reaching to the ground; navel cistiferous. Another variety with erect ears, a little pointed; tail reaching nearly to the ground. The first inhabits Guiana; the

second Siam. Less than the common hog; tail naked; body red; hair longer on the head and buttocks than elsewhere.

Sus, a river of Morocco, which forms the S. boundary of that empire, and enters the Atlantic, at Messa. Like the Nile, its annual inundations enrich the country.

Sus, one of the three grand divisions of the empire of Morocco; bounded on the W. by the Atlantic, on the N. by Mount Atlas, on the E. by Gesula, and on the S. by the river Sus. It is a flat country, abounding in corn, sugar-canes, and dates. The inhabitants, who are chiefly Berebers, or ancient natives, are distinguished by their industry; and many of them, who live in towns, become opulent, and are much more polite than the natives of Fez and Morocco. In the mountainous part they are entirely free, and are governed by their own chiefs. The principal town is Tarudant.

SUSA, a celebrated city of Asia, the chief town of Susiana, and the capital of the Persian empire, built by Tithonus the father of Memnon. Cyrus took it. The walls of Susa were above 120 stadia in circumference. The treasures of the kings of Persia were generally kept there, and the royal palace was built with white marble, and its pillars were covered with gold and precious stones. It has been called Memnonia, or the palace of Memnon, because that prince reigned there.

SUSCEPTIBI'LITY. *s.* (from *susceptible.*) Quality of admitting; tendency to admit (*Hale*).

SUSCE'PTIBLE. *a.* (*susceptible*, Fr.) Capable of admitting; disposed to admit (*Locke*).

SUSCE'PTION. *s.* (*susceptus*, Latin.) Act of taking (*Ayliffe*).

SUSCE'PTIVE. *a.* (from *susceptus*, Latin.) Capable to admit (*Watts*).

SUSCI'PIENCY. *s.* (from *suscipient.*) Reception; admission.

SUSCI'PIENT. *s.* (*suscipiens*, Latin.) One who takes; one that admits or receives.

To SU'SCITATE. *v. n.* (*susciter*, Fr. *suscitio*, Lat.) To rouse; to excite (*Brown*).

SUSCITA'TION. *s.* (*suscitation*, Fr. from *suscitate.*) The act of rousing or exciting.

SUSDAL, a town of Russia, in the government of Volodimir, and a bishop's see. It is built of wood, and seated on the Nerl, 90 miles N.E. of Moscow. Lon. 40. 25 E. Lat. 56. 26 N.

SUSIANA, or Susis, a country of Asia, of which the capital was called Susa. It was situate at the E. of Assyria. It abounds with lilies, whence it got its name Susan, signifying a lily in Hebrew.

To SUSPE'CT. *v. a.* (*suspecto*, *suspectum*, Lat.) 1. To imagine with a degree of fear and jealousy what is not known (*Milton*). 2. To imagine guilty without proof (*Locke*). 3. To hold uncertain; to doubt (*Addison*).

To Suspe'ct. *v. n.* To imagine guilt (*Shakspeare*).

Suspe'ct. *part. a.* (*suspect*, Fr.) Doubtful (*Glanville*).

Suspe'ct *s.* Suspicion: obsolete (*Suckling*).

To SUSPE'ND. *v. a.* (*suspendre*, French; *suspendo*, Lat.) 1. To hang; to make to hang by any thing (*Donne*). 2. To made to depend upon (*Tillotson*). 3. To interrupt; to make to stop for a time (*Denham*). 4. To delay; to hinder from proceeding (*Shakspeare*). 5. To keep undetermined (*Locke*). 6. To debar for a time from the execution of an office or enjoyment of revenue (*Swift*).

SUSPE'NSE. *s.* (*suspensus*, Latin.) 1. Uncertainty; delay of certainty or determination; indetermination (*Hooker*). 2. Act of withholding the judgment (*Locke*). 3. Stop in the midst of two opposites (*Pope*).

Suspe'nse. *a.* (*suspensus*, Latin.) 1. Held from proceeding (*Milton*). 2. Held in doubt; held in expectation (*Milton*).

SUSPEN'SION. *s.* (from *suspend.*) 1. Act of making to hang on any thing. 2. Act of making to depend on any thing. 3. Act of delaying (*Waller*). 4. Act of withholding or balancing the judgment (*Grew*). 5. Interruption; temporary cessation (*Clarend.*). 6. Temporary privation of an office.

Suspension of arms, in war, a short truce agreed on by both armies, in order to bury the dead, wait for fresh instructions, or the like.

Suspension, in rhetoric, is the carrying on a period or discourse, in such a manner as to keep the reader in expectation of something considerable in the conclusion. But great care must be taken that the reader's expectation be not disappointed; for nothing is more contemptible than to promise much and perform little; or to usher in an errant trifle with the formality of preface and solemn preparation.

Suspension (Centre or axis of), in mechanics, the point or axis on which a pendulous or revolving body turns, or from which it hangs.

SUSPE'NSORY. *a.* (*suspensoire*, Fr.) That by which any thing hangs (*Ray*).

SUSPI'CION. *s.* (*suspicion*, French; *supicio*, Lat.) The act of suspecting; imagination of something ill without proof (*Milton*).

SUSPI'CIOUS. *a.* (*suspiciosus*, Lat.) 1. Inclined to suspect; inclined to imagine ill without proof (*Swift*). 2. Indicating suspicion or fear (*Swift*). 3. Liable to suspicion; giving reason to imagine ill (*Hooker*).

SUSPI'CIOUSLY. *ad.* (from *suspicious.*) 1. With suspicion. 2. So as to raise suspicion (*Sidney*).

SUSPI'CIOUSNESS. *s.* (from *suspicious.*) Tendency to suspicion (*Sidney*).

SUSPIRA'TION. *s.* (*suspiratio*, Lat.) Sigh; act of fetching the breath deep (*More*).

To SUSPI'RE. *v. a.* (*suspiro*, Latin.) 1. To sigh; to fetch the breath deep. 2. It seems in *Shakspeare* to mean only, to begin to breathe.

SUSQUEHANNA, a river of the United States, which issues from the lake Otsego. It three times crosses the line that divides the state of New York from Pennsylvania; after which it flows S.E. to Wilkesbarre, and then S.W. to Sunbury, where it meets the W. branch of the Susquehanna. It then flows by

Harrisburg to Havre de Grace, where it enters the head of Chesapeak bay.

SUSSEX, a county of England, 70 miles long, and 28 where broadest; bounded on the N. by Surry, N.E. and E. by Kent, S. by the English channel, and W. by Hampshire. It contains 935,040 acres; is divided into five rapes, subdivided into 65 small hundreds, and 342 parishes; has one city and 16 market-towns, and sends 18 members to parliament. The number of inhabitants in 1801 was 159,311. (See POPULATION.) The soil is various: that of the downs, and thence to the sea, is fertile in corn and grass, the latter feeding sheep whose wool is remarkably fine; the middle abounds with meadows and rich arable ground; and the N. side is shaded with extensive woods, that used to supply fuel for the iron-works when they were in a flourishing state. The chief commodities are corn, malt, cattle, wool, wood, iron, chalk, and glass; and it is particularly famous for wheatears, a delicious bird of the size of a lark, which are taken in great numbers on the S.E. downs. Sussex is not distinguished for any manufacture, but that of gunpowder at Battle, and of needles at Chichester. The principal rivers are the Arun, Adur, Ouse, and Rother. Chichester is the capital; but the spring assizes are held at Horsham, and the summer at Lewes.

To SUSTA'IN. *v. a.* (*soustenir*, Fr. *sustineo*, Lat.) 1. To bear; to prop; to hold up (*More*). 2. To support: to keep from sinking under evil (*Tillotson*). 3. To maintain; to keep (*Davies*). 4. To help; to relieve; to assist (*Shakspeare*). 5. To bear; to endure (*Addis.*). 6. To bear without yielding (*Waller*). 7. To suffer; to bear as inflicted (*Milton*).

SUSTAI'NABLE. *a.* (*soustenuble*, Fr. from *sustain.*) That may be sustained.

SUSTAI'NER. *s.* (from *sustain.*) 1. One that props; one that supports. 2. One that suffers; a sufferer (*Chapman*).

SU'STENANCE. *s.* (*soustenance*, French.) 1. Support; maintenance (*Addison*). 2. Necessaries of life; victuals (*Temple*).

SUSTENTA'TION. *s.* (from *sustento*, Lat.) 1. Support; preservation from falling (*Boyle*). 2. Use of victuals (*Brown*). 3. Maintenance; support of life (*Bacon*).

SUSURRA'TION. *s.* (from *susurro*, Lat.) Whisper; soft murmur.

SUTHERLANDSHIRE, a county of Scotland, 52 miles long and 50 broad; bounded on the N. by the North sea, E. by Caithnessshire and the German ocean, S. by the frith of Dornoch and Rossshire, and W. by the Minch. It is divided into 13 parishes, and the number of inhabitants in 1801 was 23,117. Some parts of this county, called forests, are trackless deserts, destitute of trees; or bleak mountains, abounding with wild roes. In these parts there are few inhabitants, and no villages; but along the frith of Dornoch, the country is populous and well cultivated. It has abundance of iron-stone, limestone, and slate; also many veins of lead ore, but as yet none have been wrought. Dornoch is the county-town.

SU'TLER. *s.* (*soteler*, Dutch; *sudler*, Ger.) A person that sells provisions and liquor in a camp (*Dryden*).

SUTTON (Thomas), the founder of the Charter-house, was born in Lincolnshire, in 1532. He was educated at Eton college, and studied the law in Lincoln's-inn: but this profession not suiting his disposition, he went abroad, and acquired a perfect knowledge of the Dutch, French, and Spanish languages. On his return he became secretary to the earl of Warwick, who in 1569 appointed him master of the ordnance at Berwick. He purchased of the bishop of Durham the manors of Gateshead and Wickham; which producing coal mines, became to him a source of extraordinary wealth. Soon after, he married a rich widow, who brought him a considerable estate. He also became a merchant, so that his riches accumulated on every hand. He moreover held some lucrative places under the government. His whole fortune at his death appears to have been, in land 5,000l. per annum; in money 60,000l. On the death of his lady in 1602, he retired from the world, and lived in a private manner; and having no issue, he resolved to distinguish his name by some important charity. Accordingly, he purchased the Charter-house, near Smithfield, for the sum of 13,000l. where he founded the present hospital in 1611, for the relief of poor men and children. He died at Hackney, in 1611.

SUTTON COLEFIELD, a corporate town in Warwickshire, with a market on Monday, seated in a barren chase, 24 miles N.N.W. of Warwick, and 110 N.W. of London.

SUTURE. (*sutura*, from *suo*, to join together.) In surgery, this term signifies the closure of wounds by sewing. A number of different kinds of sutures have been recommended by writers on surgery, but all of them are now reduced to two: namely, the twisted, and the interrupted. The twisted suture is made in the following manner: having brought the divided parts nearly into contact, a pin is to be introduced from the outside inwards, and carried out through the opposite side to the same distance from the edge that it entered at on the former side; a firm wax ligature is then to be passed around it, making the figure of 8, by which the wounded parts are drawn gently into contact. The number of pins is to be determined by the extent of the wound: half an inch, or at most three quarters, is the proper distance between two pins. The interrupted suture is practised where a number of stitches is required, and the interruption is only the distance between the stitches.

In anatomy, the word suture is applied to the union of bones by means of dentiform margins, as in the bones of the cranium. See TEMPORAL, SPHÆNOIDAL, ZYGOMATIC, TRANSVERSE, CORONAL, LAMBDOIDAL, and SAGITTAL SUTURES, as also ANATOMY.

SWAB. *s.* (*swabb*, Swedish.) A kind of mop to clean floors.

To SWAB. *v. a.* (ſƿebban, Saxon.) To clean with a mop. Used chiefly at sea (*Shelvock*).

SWA′BBER. *s.* (*swabber*, Dut.) A sweeper of the deck (*Dennis*).

To SWA′DDLE. *v. a.* (ꞅpeðan, Sax.) 1. To swathe; to bind in clothes, generally used of binding new-born children (*Sandys*). 2. To beat; to cudgel (*Hudibras*).

SWA′DDLE. *s.* (from the verb.) Clothes bound round the body (*Addison*).

SWA′DDLINGBAND. SWA′DDLINGCLOTH. SWA′DDLINGCLOUT. *s.* (from *swaddle.*) Cloth wrapped round a new-born child (*Spenser. Shakspeare*).

SWAFFHAM, a town in Norfolk, with a market on Saturday, noted for butter. The church is handsome, and in the form of a cathedral. It is seated on a hill, 28 miles W. of Norwich, and 93 N.E. of London.

To SWAG. *v. n.* (ꞅɪᵹan, Saxon.) To sink down by its weight; to hang heavy (*Grew*).

To SWAGE. *v. a.* (from *usswage.*) To ease; to soften; to mitigate (*Otway*).

To SWA′GGER. *v. n.* (ꞅpeᵹan, Sax.) To bluster; to bully; to be turbulently and tumultuously proud and insolent (*Collier*).

SWA′GGERER. *s.* (from *swagger.*) A blusterer; a bully; a turbulent noisy fellow (*Shakspeare*).

SWA′GGY. *a.* (from *swag.*) Dependent by its weight (*Brown*).

SWAIN. *s.* (ꞅpein, Saxon and Runic.) 1. A young man (*Spenser*). 2. A country servant employed in husbandry (*Shaks.*). 3. A pastoral youth (*Pope*).

SWA′INMOTE. *s.* A court touching matters of the forest, kept by the charter of the forest thrice in a year (*Cowell*).

SWALE, a river in Yorkshire, which rises on the confines of Westmorland, flows E. by Richmond and then S.E. to its junction with the Ure, a little below Aldborough, where their united stream forms the Ouse.

To SWALE. *To* SWEAL. *v. n.* (ꞅpelan, Saxon, to kindle.) To waste or blaze away; to melt: as, *the candle* swales.

SWA′LLET. *s.* Among tin-miners, water breaking in upon the miners at their work.

SWALLOW, in ornithology. See HIRUNDO.

SWALLOW-TAIL, in botany. See SALIX.

SWALLOW-WORT. See ASCLEPIAS.

SWALLOW-WORT (African). See STAPELIA.

To SWA′LLOW. *v. n.* (ꞅpelᵹan, Saxon.) 1. To take down the throat (*Locke*). 2. To receive without examination (*Locke*). 3. To engross; to appropriate (*Pope*). 4. To absorb; to take in; to sink in any abyss; to ingulf (*Shakspeare*). 5. To occupy (*Locke*). 6. To seize and waste (*Thomson*). 7. To engross; to engage completely (*Isaiah*).

SWA′LLOW. *s.* (from the verb.) The throat; voracity (*South*).

SWALLY, a town of Hindustan, in Guzerat, with a harbour, where ships receive and deliver their cargoes for the merchants of Surat. It is seated near the gulf of Cambay, 15 miles W. of Surat. Lon. 72. 33 E. Lat. 21. 10 N.

SWALWELL. See SMEELWELL.

SWAM. The preterit of *swim.*

SWAMMERDAM (John), a celebrated and learned natural philosopher, was the son of John James Swammerdam, an apothecary and famous naturalist of Amsterdam, and was born in 1637. His father intended him for the church, and with this view had him instructed in Latin and Greek; but he, thinking himself unequal to so important a task, prevailed with his father to consent to his applying himself to physic. As he was kept at home till he should be properly qualified to engage in that study, he was frequently employed in cleaning his father's curiosities, and putting every thing in its proper place. This inspired our author with an early taste for natural history; so that, not content with the survey of the curiosities his father had purchased, he soon began to make a collection of his own, which he compared with the accounts given of them by the best writers. When grown up, he seriously attended to his anatomical and medical studies; yet spent part of the day and the night in discovering, catching, and examining the flying insects proper to those times, not only in the province of Holland, but in those of Guelderland and Utrecht.—Thus initiated in natural history, he went to the university of Leyden in 1651; and in 1663 was admitted a candidate of physic in that university. His attention being now engaged by anatomy, he began to consider how the parts of the body prepared by dissection could be preserved, and kept in constant order for anatomical demonstration; and herein he succeeded, as he had done before in his nice contrivances for dissecting and managing the minutest insects. Our author afterwards made a journey into France, where he spent some time at Saumur, and where he became acquainted with several learned men. In 1667 he returned to Leyden, and took his degree of doctor of physic. The next year the grand duke of Tuscany being in Holland in order to see the curiosities of the country, came to view those of our author and his father; and on this occasion Swammerdam made some anatomical dissections of insects in the presence of that prince, who was struck with admiration at our author's great skill in managing them, especially at his proving that the future butterfly lay with all its parts neatly folded up in a caterpillar, by actually removing the integuments that covered the former, and extricating and exhibiting all its parts, however minute, with incredible ingenuity, by means of instruments of inconceivable fineness. On this occasion the duke offered our author 12,000 florins for his share of the collection on condition of his removing them himself into Tuscany, and coming to live at the court of Florence; but Swammerdam, who hated a court life, declined his highness's proposal. In 1663 he published a General History of Insects. About this time, his father began to take offence at his inconsiderately neglecting the practice of physic, which might have supported him in affluence; and would neither supply him with money nor clothes. This reduced him to some difficulties. In 1675 he published his History of the Ephemeras; and his father dying the same year, left him a fortune sufficient for his support: but he did not long survive him, for he died in 1682. Gaubius gave a translation of all his works from the original Dutch into Latin, from which they were translated into English, in folio, in 1758. The celebrated Boerhaave wrote his life.

SWAMP. *s.* (ꞅƿam, Saxon; *swamp*, Swedish) A marsh; a bog; a fen.

SWA'MPY. *a.* (from *swamp.*) Boggy; fenny (*Thomson*).

SWAN, in ornithology. See ANAS.

SWANAGE, a village in Dorsetshire, seated on a bay of the same name, in the English channel, four miles E.S.E. of Corfe Castle. It has a trade in herrings; also quarries of fine stone, of which many thousand tons are shipped here annually. See PURBECK, Isle of.

SWANPAN, or CHINESE ABACUS; an instrument for forming arithmetical operations, described by Du Halde in his History of China. It is composed of a small board, crossed with 10 or 12 parallel rods or wires, each strung with ivory balls, which are so divided by a partition in the middle, that two are on one side of it, and five on the other. The two in the upper part stand each for five units, and each of the five in the lower part for one. "In joining and separating these balls, they reckon much as we do with counters; but, according to our author, more expeditiously than Europeans do even with figures." This is hardly credible; but if all the Chinese weights and measures be decimally divided, as by his very lame description of the swanpan they would appear to be, it is easy to conceive how computation may be made by this instrument very expeditiously. The instrument, too, may be so contrived as to suit any division of weights and measures, and in that form be useful to the blind; but as we have elsewhere given descriptions of superior instruments, for their accommodation (see BLIND), it is needless to offer in this place any improvement of the swanpan.

SWANSEA, a seaport and borough of Wales, in Glamorganshire, governed by a portreeve, with a market on Wednesday and Saturday, an old castle, and two churches. Coal, iron, and limestone abound in its neighbourhood, of which great quantities are exported. It has a considerable trade to Bristol, and great works for the smelting of copper and lead ore. Many ships have been built here, and it is resorted to for sea-bathing. The number of inhabitants in 1801 was 6421. It is seated near the mouth of the Tawy, 32 miles S.W. of Brecknock, and 206 W. of London. Lon. 3. 56 W. Lat. 51. 37 N.

SWA'NSKIN. *s.* A kind of soft flannel, imitating for warmth the down of a swan.

SWAP. *ad.* Hastily; with hasty violence: as, *he did it swap.* A low word.

To SWAP. *v. a.* To exchange; to swop.

SWARD. *s.* (*sward*, Swedish.) 1. The skin of bacon. 2. The surface of the ground: whence *green sward*, or *green swerd* (*A. Philips*).

SWARE. The preterit of *swear*.

SWARM. *s.* (ꞅƿeaꞃm, Saxon; *swerm*, Dutch.) 1. A great body or number of bees or other small animals (*Dryden*). 2. A multitude; a crowd (*Shakspeare*).

To SWARM. *v. n.* (ꞅƿeaꞃman, Saxon; *swermen*, Dutch.) 1. To rise as bees in a body, and quit the hive (*Dryden*). 2. To appear in multitudes; to crowd; to throng (*Milton*). 3. To be crowded; to be overrun; to be thronged (*Howel*). 4. To breed multitudes (*Milton*).

SWART. SWARTH. *a.* (*swarts*, Gothic; ꞅƿeaꞃꞇ, Saxon; *swart*, Dutch.) 1. Black; darkly brown; tawny (*Spenser*). 2. Gloomy; malignant (*Milton*).

To SWART. *v. a.* (from the noun.) To blacken; to dusk (*Brown*).

SWA'RTHILY. *a.* (from *swarthy.*) Blackly; duskily; tawnily.

SWA'RTHINESS. *s.* (from *swarthy.*) Darkness of complexion; tawniness.

SWA'RTHY. *a.* (See SWART.) Dark of complexion; black; dusky; tawny (*Roscommon.*)

SWARTZIA, in botany, a genus of the class polyandria, order monogynia. Calyx four-leaved; petal one, lateral, flat; legume one-celled, two-valved; seeds coated. Seven species, trees of the West Indies and America.

SWASH. *s.* (A cant word.) A figure, whose circumference is not round, but oval; and whose mouldings lie not at right angles, but oblique to the axis of the work (*Moxon*).

SWASH. *s.* (from the verb.) Impulse of water flowing with violence.

To SWASH. *v. n.* To make a great clatter or noise: whence *swashbuckler* (*Shakspeare*).

SWA'SHER. *s.* (from *swash.*) One who makes a show of valour or force: obsolete (*Shakspeare*).

SWATCH. *s.* A swath: not in use (*Tusser*).

SWATH. *s.* (*swade*, Dutch.) 1. A line of grass cut down by the mower (*Mortimer*). 2. A continued quantity (*Shaks.*). 3. A band; a fillet (*Addison*).

To SWATHE. *v. a.* To bind, as a child with bands and rollers (*Abbot*).

To SWAY. *v. a.* (*schwehen*, German, to move.) 1. To wave in the hand; to move or wield any thing massy (*Spenser*). 2. To bias; to direct to either side (*Shakspeare*). 3. To govern; to rule; to overpower; to influence (*Dryden*).

To SWAY. *v. n.* 1. To hang heavy; to be drawn by weight (*Bacon*). 2. To have weight; to have influence (*Hooker*). 3. To bear rule; to govern (*Milton*).

SWAY. *s.* (from the verb.) 1. The swing or sweep of a weapon (*Milton*). 2. Any thing moving with bulk and power (*Shakspeare*). 3. Weight; preponderation; cast of the balance (*Milt.*). 4. Power; rule; dominion (*Hook.*). 5. Influence; direction; weight on some side (*Dryden*).

To SWEAR. *v. n.* preterit *swore* or *sware;* part. pass. *sworn.* (ꞅƿeꞃian, Saxon; *sweeren,* Dutch.) 1. To obtest some superior power; to utter an oath (*Tickel*). 2. To declare or promise upon oath (*Gen.*). 3. To give evidence upon oath (*Shaks.*). 4. To obtest the great name profanely (*Tillotson*).

To SWEAR. *v. a.* 1. To put to an oath; to bind by an oath administered (*Dryden*). 2. To declare upon oath: as, *he* swore *treason against his friend.* 3. To obtest by an oath (*Shakspeare*).

SWE'ARER. *s.* (from *swear.*) A wretch who obtests the great name wantonly and profanely (*Swift*).

SWEARING is an offence punishable by several statutes. thus stat. 6 and 7 Will. III. cap. 11. ordains, that if any person shall profanely swear, if he is a labourer, servant, or common soldier, he shall forfeit 1s. to the poor, for the first offence, 2s. for the second, &c.: and any person not a servant, &c. forfeits 2s. for the first offence, 4s. for the second, 6s. for the third, &c. to be levied by distress of goods.

SWEAT. See PERSPIRATION.

To SWEAT. *v. n.* preterit *swet, sweated;* participle pass. *sweaten.* (from the noun.) 1. To be moist on the body with heat or labour (*Cowley*). 2. To toil; to labour; to drudge (*Waller*). 3. To emit moisture (*Mortimer*).

To SWEAT. *v. a.* 1. To emit as sweat (*Dryden*). 2. To make to sweat.

SWE'ATER. *s.* (from *sweat.*) One that sweats, or makes to sweat.

SWEATING (Immense). See EPHYDROSIS.

SWEATING IRON, in the manage, a piece of a scythe, about a foot long, and of the breadth of about three or four fingers, very thin, and which cuts only with one side. When the horse is very hot, and the grooms have a mind to take off the sweat, they take this in their two hands, and gently run the edge along the horse's skin, commonly with the grain, or as the hair lies, with intent to scrape off the sweat and dry the horse.

SWEATING FOR THE TURF, a process performed to keep the wind of a horse in a state of excellence, and to prevent a superfluous accumulation of flesh. Horses in training are (in strict conformity with this intent) sweated at certain periods, or intervals, of six, seven, or eight days each; which are brought nearer to, or delayed farther from each other, by the reduced state of the animal sweated. The ceremony is performed in the morning, soon after the dawn of day, under an opinion, that the air is then more pure than at any other part of the twenty-four hours.

The horse intended to be sweated is loaded with a profusion of sheets, quarter-pieces, and horse-cloths; the number and weight proportioned to the quantity of perspirative matter it is intended he should lose: when all this is completely adjusted in the stable, he is brought to the exercise ground, with a light or feather weight upon his back, where, after having been walked time sufficient to afford ample opportunities of unloading the carcase by excrementitious evacuation, he is permitted to start for a sweat of two, three, four, or five miles, according to his age, his strength, his state of flesh, and the kind of race (in respect to distance) he is in training for; as well as the sort of course he is intended to run over. The horse begins at a very slow rate, and so continues till he has covered half the ground he is to go over, when he has his speed moderately increased during the third quarter, advancing however by degrees, so that his fourth is at a rapidity very little short of his rate in racing.

Having ran his ground, and pulled up, he is walked in hand for a few minutes, to give time (in the language of the turf) for the sweat to come out, which, when the cloths are taken off, follows in copious streams. At this moment two assistants are ready with each a thin wooden instrument, called a scraper, made of oak or ash, in shape resembling half the blade of a mowing scythe, (narrowed at the ends for the convenience of the hands,) and with this they scrape the sweat from the neck, back, sides, belly, and quarters, so long as the least moisture is observed to appear; after which the scrapers are exchanged for wisps of soft straw, or separated haybands, until the body, and every part, is perfectly clean and refreshed. The horse is then furnished with dry sheets, hood, &c. brought to the ground for the purpose; when being led home to the stable, he is supplied with the necessary quantity of soft water, a little warm, previous to undergoing a regular and complete dressing, with greater nicety, than in the open air: when this is systematically gone through, he has a farther moderate supply of water, which is most commonly followed by a warm and comfortable mash; after which the door is closed for a double period of the usual hours for going to stable when a horse has not been sweated; and although he undergoes the afternoon and evening routine of being fed, set fair, &c. he is neither stripped, or proceeds to exercise, any more on that day.

SWEATING OF JOCKIES, in the turf vocabulary, a ceremony which every jockey is under the necessity of going through when engaged to ride, and the horse is to carry less than his own natural weight. The means of reducing themselves to the weight required are various, and depend upon the greater or lesser quantity they have to lose in a given time. If they have but two or three pounds to lose, they will waste that in a single day's abstinence, and a morning and evening's walking: should four or five pounds be required, a gentle laxative, followed by two or three days extra walking, with an additional waistcoat or two, will generally carry the point: if more be necessary to be lost, it is sometimes a hazardous reduction, and great exertions are made to effect it: additional purgation, continued abstinence, increased perspiration, and almost perpetual exercise. Instances are numerous of jockies having undertaken to waste fourteen or sixteen pounds against the day of running; and this being at no great distance, they have, in addition to the evacuations already described, submitted their bodies to the fumes of a hot-bed; and what is still more extraordinary, to be immersed in the stench and steam of a dunghill to effect their purpose; which methods have often been attended with the most fatal effects from the debility hereby produced.

SWE'ATY. a. (from *sweat.*) 1. Covered with sweat; moist with sweat (*Milton*). 2. Consisting of sweat (*Swift*). 3. Laborious; toilsome (*Prior*).

SWEDEN, a kingdom of Europe, extending 1100 miles from N. to S., and 600 from E. to W.; bounded on the N. by Danish Lapland, E. by Russia, S. by the gulf of Finland and the Baltic, and W. by the Sound, the Categat and Norway. It is divided into five general parts; Sweden Proper, Gothland, Nordland, Lapland, and Finland; and each of these is subdivided into provinces. Sweden Proper contains Upland, Sudermania, Nericia, Westmania, and Dalecarlia. Gothland contains East Gothland, Smoland, West Gothland, Wermeland, Bahus, Dalia, Schonen, Halland, Blekingen, and the isles of Gothland and Oeland. Nordland includes Gestricia, Helsingia, Medelpadia, Jemptia, Angermania, and West Bothnia. Swedish Lapland comprises Uma, Pitha, Lula, Tornea, and Kemi: these have no towns, and take their names from rivers that rise near the borders of Norway and flow into the gulf of Bothnia. Finland contains Finland Proper, East Bothnia, Tavesteland, Nyland, Savolax, and that part of Kymene and Carelia which Sweden has preserved. The whole country is well watered by rivers (though not a single navigable one worth mentioning) numerous lakes, and inland pieces of water, on the banks of which the palaces and villas are usually built. At Stockholm, spring and autumn are scarcely to be perceived; for winter continues nine months, and summer during the remaining three. In winter the cold is excessive, and in summer the heat is considerable, the air being serene all that time. All the rocks are quite covered with flowers in the summer time, and the gardens have plenty of fruits. The trees are early in blossoming, the soil being fat and sulphureous; but the fruits have not so good a taste as in the more southern countries. The animals are horses, cows, hogs, goats, sheep, elks, raindeer, bears, wolves, foxes, wild cats, and squirrels. The horses are so little and feeble, that seven are put to a travelling carriage, four abreast in the first line, and three in the second; but a lame or foundered horse is seldom to be seen, which is attributed, in a certain degree, to the manner of stabling them on perforated boards without litter. Here are several sorts of fowls; and partridges, woodcocks, and falcons, in great plenty. It has rich silver, copper, and iron mines, and vast forests of timber trees. The articles of export are boards, gunpowder, leather, iron, copper, tallow, skins, pitch, resin, and masts; and it imports salt, brandy, wine, linen cloth, stuffs, tobacco, sugar, spice, and paper. The inhabitants are of a robust constitution, and able to sustain the hardest labour. They are more polished than formerly; and have several public schools and colleges, where the arts and sciences are taught. Their houses are generally of wood, with very little art in their construction. The roofs, in many places, are covered with turf, on which their goats often feed. The form of the Swedish government has frequently varied. Before the accession of Gustavus I. it was an elective monarchy. By the union of Calmar, in 1397, it was stipulated that the same monarch should rule over Denmark, Sweden, and Norway; and hence Sweden became a mere tributary kingdom to Denmark. From this state of subjection to a tyrannical foreign yoke it was rescued by Gustavus Vasa, on whom the Swedes, in 1523, conferred the sovereignty, and made the crown hereditary in his male issue. He was entrusted with great prerogatives; and these were augmented by Gustavus Adolphus, the right of succession being extended, at the same time, to the female line. In the minority of his daughter Christina, the regal powers were greatly circumscribed, and the nobles acquired such an exorbitant authority, as gave great umbrage to the clergy, citizens, and peasants. This proved a favourable opportunity for Charles XI. to obtain from the states a formal cession of absolute sovereignty, which quietly devolved upon his son Charles XII. Upon the death of the latter, the Swedes conferred the crown upon Ulrica Eleanora, his youngest sister; stipulating, at the same time, great limits to the prerogative. Ulrica resigned the crown to her consort Frederic I. From this period, the Swedish monarch was the most limited one in Europe, till 1772, when Gustavus III. effected a revolution, by which he regained the most essential royal prerogatives, without, however, being an absolute monarch. He was assassinated in 1792, leaving his son Gustavus Adolphus a minor, who attained his majority in 1796. Sweden, like most other countries on the continent, has been exposed to the baneful effect of French influence; in consequence of which the king abdicated the throne, and fled to England. The government is now in the hands of a French usurper. The established religion is the Lutheran, and they have one archbishop, and thirteen bishops. The capital is Stockholm.

SWEDEN PROPER, one of the five grand divisions of Sweden, bounded on the S. by Gothland, W. by Norway, N. by Nordland, and E. by the Baltic sea. It comprehends five provinces, and Stockholm, the capital of all Sweden.

SWEDENBORGIANS, the followers of Emanuel Swedenborg, a Swedish nobleman, who was born at Stockholm in 1689, and died in London, 1772. He professed himself to be the founder (under the Lord) of the New Jerusalem church, alluding to the New Jerusalem spoken of in the book of the Revelation of St. John. His tenets, although peculiarly distinct from every other system of divinity in christendom, are nevertheless drawn by him from the Holy Scriptures, and supported by numberless quotations from them. He asserts, that in the year 1743, the Lord manifested himself to him in a personal appearance; and at the same time opened his spiritual eyes, so that he was enabled constantly to see and converse with spirits and angels. From that time he began to print and publish various wonderful things, which, he says, were revealed to him, relating to heaven and hell, the state of men after death, the worship of God, the spiritual sense of the scriptures, the various earths in the universe, and their inhabitants, with many other extraordinary particulars, the knowledge of which was, perhaps, never pretended to by any other writer, before or since his time. He denies a Trinity of persons in the Godhead, but contends for a divine Trinity in the single person of Jesus Christ alone, consisting of a Father, Son, and Holy Spirit, just like the human Trinity in every individual man, of soul, body, and proceeding operation; and he asserts, that as the latter Trinity constitutes one man, so the former Trinity constitutes one Jehovah God, who is at once the Creator, Redeemer, and Regenerator. On this and other subjects, Dr. Priestley addressed letters to the members of the New Jerusalem church, to which several replies were made, and particularly one by Mr. R. Hindmarsh, a printer.

Baron Swedenborg further maintains, that the sacred scripture contains three distinct senses, called celestial, spiritual, and natural, which are united by correspondencies; and that in each sense it is divine truth, accommodated respectively to the angels of the three heavens, and also to men on earth. This science of correspondencies (it is said) has been lost for some thousands of years, viz. ever since the time of Job, but is now revived by Emanuel Swedenborg, who uses it as a key to the spiritual or internal sense of the sacred scripture, every page of which, he says, is written by correspondencies, that is, by such things in the natural world as correspond unto and signify things in the spiritual world. He denies the doctrine of atonement, or vicarious sacrifice, together with the doctrines of predestination, unconditional election, justification by faith alone, the resurrection of the material body, &c. and in opposition thereto maintains, that man is possessed of free-will in spiritual things; that salvation is not attainable without repentance, that is, abstaining from evils because they are sins against God, and living a life of charity and faith, according to the commandments; that man, immediately on his decease, rises again in a spiritual body, which was inclosed in his material body, and that in this spiritual body he lives as a man to eternity, either in heaven or in hell, according to the quality of his past life.

It is further maintained by Swedenborg and his followers, that all those passages in the sacred scripture which are generally supposed to signify the destruction of the world by fire, &c. commonly called the last judgment, must be understood according to the above-mentioned science of correspondencies, which teaches, that by the end of the world, or consummation of the age, is not signified the destruction of the world, but the destruction or end of the present Christian church, both among Roman Catholics and Protestants of every description or denomination; and that this last judgment actually took place in the spiritual world in the year 1757; from which æra is dated the second advent of the Lord, and the commencement of a new Christian church, which, they say, is meant by the new heaven and new earth in the Revelation, and the New Jerusalem thence descending.

Such are the general outlines of baron Swedenborg's principal doctrines, collected from his voluminous writings. His followers are numerous in England, Germany, Sweden, &c. and also in America. They use a liturgy, and instrumental as well as vocal music, in their public worship. There was a society established in London, in 1810, for printing and publishing the writings of baron Swedenborg. Their office is at 47, Devonshire-street, Queen-square, where they sell translations of all Swedenborg's theological works. We beg to acknowledge the receipt of two of their publications, *viz.* The Life of Swedenborg, with the Eulogium of M. Sandel, delivered in the great hall of the Stockholm house of nobles, and The Doctrine of New Jerusalem respecting the Lord. They did not arrive early enough for us to do more than make this general reference.

To SWEEP. *v. a.* pret. and part. pass. *swept.* (ꞅpapan, Sax.) 1. To drive away with a besom. 2. To clean with a besom (*Luke*). 3. To carry with pomp (*Shakspeare*). 4. To drive or carry off with celerity and violence (*Fenton*). 5. To pass over with celerity and force. 6. To rub over (*Dryden*). 7. To strike with a long stroke (*Pope*).

To Sweep. *v. n.* 1. To pass with violence, tumult, or swiftness (*Dryden*). 2. To pass with pomp; to pass with an equal motion (*Shakspeare*). 3. To move with a long reach (*Dryden*).

Sweep. *s.* (from the verb.) 1. The act of sweeping. 2. The compass of any violent or continued motion (*Philips*). 3. Violent and general destruction (*Graunt*). 4. Direction of any motion not rectilinear (*Sharp*).

SWEEPER. *s.* (from *sweep.*) One that sweeps.

SWEEPINGS. *s.* (from *sweep.*) That which is swept away (*Swift*).

SWEE'PNET. *s.* (*sweep* and *net.*) A net that takes in a great compass (*Camden*).

SWEE'PSTAKE. *s.* (*sweep* and *stake.*) A man that wins all (*Shakspeare*).

SWEE'PY. *a.* (from *sweep.*) Passing with great speed and violence over a great compass at once (*Dryden*).

SWEET. *a.* (ꞅpeꞇe, Saxon; *soet*, Dutch.) 1. Pleasing to any sense (*Watts*). 2. Luscious to the taste (*Davies*). 3. Fragrant to the smell (*Gay*). 4. Melodious to the ear (*Waller*). 5.

Beautiful to the eye (*Shakspeare*). 6. Not salt (*Bacon*). 7. Not sour (*Bacon*). 8. Mild; soft; gentle (*Milton*). 9. Grateful; pleasing (*Dryden*). 10. Not stale; not stinking: as, *that meat is* sweet.

SWEET. *s.* 1. Sweetness; something pleasing (*Locke*). 2. A word of endearment (*Shakspeare*). 3. A perfume (*Dryden*).

SWEE'TBREAD. *s.* The pancreas of the calf (*Swift*).

SWEET APPLE, in botany. See ANNONA.

SWEET BRIAR. See ROSA.

SWEET FLAG. See ACORUS.

SWEET SULTAN. See CENTAUREA MOSCHATA.

SWEET GUM. See LIQUIDAMBAR.

SWEET JOHNS. See DIANTHUS.

SWEET MAUDLIN. See ACHILLEA.

SWEET PEA. See LATHYRUS.

SWEET ROOT. See GLYCIRRHIZA.

SWEET RUST. See ACORUS.

SWEET SOP. See ANNONA.

SWEET WEED. See CAPRARIA and SCOPARIA.

SWEET WILLIAM. See DIANTHUS.

SWEET WILLOW. See MYRICA.

To SWEETEN. *v. a.* (from *sweet.*) 1. To make sweet (*Swift*). 2. To make mild or kind (*South*). 3. To make less painful (*Addison*). 4. To palliate; to reconcile (*L'Estrange*). 5. To make grateful or pleasing (*Ben Jonson*). 6. To soften; to make delicate (*Dryden*).

To SWEE'TEN. *v. n.* To grow sweet (*Bacon*).

SWEE'TENER. *s.* (from *sweeten.*) 1. One that palliates; one that represents things tenderly (*Swift*). 2. That which contemperates acrimony (*Temple*).

SWEE'THEART. *s.* (*sweet* and *heart.*) A lover or mistress (*Shakspeare. Cleaveland*).

SWEE'TING. *s.* (from *sweet.*) 1. A sweet luscious apple (*Ascham*). 2. A word of endearment (*Shakspeare*).

SWEE'TISH. *a.* (from *sweet.*) Somewhat sweet (*Floyer*).

SWEE'TLY. *ad.* (from *sweet.*) In a sweet manner; with sweetness (*Swift*).

SWEE'TMEAT. *s.* (*sweet* and *meat.*) Delicacies made of fruits preserved with sugar (*Locke*).

SWEE'TNESS. *s.* (from *sweet.*) The quality of being sweet in any of its senses; fragrance; melody; lusciousness; deliciousness; agreeableness; delightfulness; gentleness of manners; mildness of aspect (*Sidney. Swift*).

To SWELL. *v. n.* participle pass. *swollen.* (ꞅƿellan, Saxon; *swellen*, Dutch.) 1. To grow bigger; to grow turgid; to extend the parts (*Dryden*). 2. To tumefy by obstruction (*Dryden*). 3. To be exasperated (*Shakspeare*). 4. To look big (*Shakspeare*). 5. To be turgid (*Roscommon*). 6. To protuberate (*Isaiah*). 7. To rise into arrogance; to be elated (*Dryden*). 8. To be inflated with anger (*Psalms*). 9. To grow upon the view (*Shakspeare*). 10. It implies commonly a motion of something wrong (*Addison*).

To SWELL. *v. a.* 1. To cause to rise or increase; to make tumid (*Shakspeare*). 2. To aggravate; to heighten (*Atterbury*). 3. To raise to arrogance (*Clarendon*).

SWELL. *s.* (from the verb.) Extension of bulk (*Shakspeare*).

SWE'LLING. *s.* (from *swell.*) 1. Morbid tumour (*Blackmore*). 2. Protuberance; prominence (*Newton*). 3. Effort for a vent (*Tatler*).

To SWELT. *v. n.* To break out in sweat (*Spenser*).

To SWE'LTER. *v. n.* To be pained with heat (*Chalkhil*).

To SWE'LTER. *v. a.* To parch, or dry up with heat (*Bentley*).

SWEL'TRY. *a.* (from *swelter.*) Suffocating with heat.

SWEPT. The participle and preterit of *sweep*.

To SWERD. *v. n.* To breed a green turf. See SWARD (*Mortimer*).

To SWERVE. *v. n.* (*swerven*, Saxon and Dutch.) 1. To wander; to rove (*Dryden*). 2. To deviate; to depart from rule, custom, or duty (*Common Prayer*). 3. To ply; to bend (*Milton*). 4. To climb on a narrow body (*Dryden*).

SWIETENIA. Mahogany-tree. In botany, a genus of the class decandria, order monogynia. Calyx five-leaved; petals five; nectary cylindrical, bearing the anthers in its mouth; capsule five-celled, woody; seeds imbricate, winged. Three species, as follow:

1. S. mahogoni. Common mahogany-tree. Leaves pinnate in about four pairs; leaflets ovate-lanceolate, equal at the base; panicles axillary. A native of the West Indies. In its native state a lofty and very branching tree, with a spreading, magnificent head; racemes subcorymbed, with about eight flowers in each, axillary, solitary, about two inches long; the flowers small, whitish; capsule large, at times of the size of a child's head, woody, ovate, smoke-colour. It is cultivated by sowing the seeds obtained from abroad in small pots filled with light sandy mould in the spring, and plunging them in a hot-bed. The plant must afterwards be treated as belonging to the hot-house.

The bark when dried has an astringent, bitter taste, more powerful than that of the Peruvian bark, and has occasionally been employed for the same medicinal purposes.

2. S. febrifuga. Leaves pinnate in about four pairs; leaflets elliptic-roundish, unequal at the base; panicle terminal, divaricate. This is a native of the East Indies, and its bark has also been advantageously employed as a febrifuge, whence its specific name.

3. S. chloroxylon. Leaves pinnate in many pairs; leaflets oblong, obtuse, narrower on one side; panicle terminal, spreading. A native of the East Indies.

The mahogoni, which is the principal of these species, is a native of the warmest parts of America, and grows also in the island of Cuba, Jamaica, Hispaniola, and the Bahama islands. It abounded formerly in the low lands of Jamaica, but is now found only on high hills and places difficult of access.

It thrives in most soils, but varies in texture and grain according to the nature of the soil. On rocks it is of a smaller size, but very hard and weighty, of a close grain, and beautifully shaded; while the produce of the low and richer lands is observed to be more light and porous, of a paler colour, and open grain; and that of mixed soils to hold a medium between both.

The wood is generally hard, takes a fine polish, and is found to answer better than any other sort in all kinds of cabinet-ware. It is now universally esteemed, and sells at a good price. It is a very strong timber, and answers very well in beams, joists, plank, boards, and shingles; and has been frequently put to those uses in Jamaica in former times. It is said to be used sometimes in ship-building; a purpose for which it is remarkably adapted, if not too costly, being very durable, capable of resisting gun-shots, and burying the shots without splintering.

SWIFT. *a.* (ꞅƿiꝼꞇ, Saxon.) 1. Moving far in a short time; quick; fleet; speedy; nimble; rapid (*Bacon*). 2. Ready; prompt (*Milton*).

Swift. *s.* The current of a stream (*Walton*).

Swift. *s.* (from the quickness of its flight.) A bird like a swallow; a martin. See Hirundo.

Swift (Jonathan), was born 30th November 1767, in Ireland, descended of an English family. His father died before his birth, and left him with his mother and a sister in indigent circumstances. At the age of six he went to Kilkenny school, and eight years after to Trinity college, Dublin. At the university he applied himself more to history and poetry than to academical learning, so that after four years residence he was refused his first degree for insufficiency, and at last took it speciali gratiâ, in terms of reproach. This roused his attention, and for the seven next years of his life, he regularly studied eight hours a day. In 1688, his uncle was attacked by an illness, which deprived him of his speech; and having thus lost a friend he passed into England to visit his mother, who resided at Leicester. Here he was introduced to sir William Temple, who had married a relation of Mrs. Swift, and in his company he continued about two years, and had frequent opportunities of seeing king William, who once offered to make him captain of horse. Swift's thoughts, however, were bent to the church. He was admitted to his master's degree at Oxford, ad eundem, 1692, and afterwards assisted his friend sir William in revising his works; but though he enlarged his knowledge, he thought himself neglected, and in 1694 a separation took place. Swift soon after obtained from Capel, the deputy of Ireland, the prebend of Kilroot, in the diocese of Connor, worth 100*l.* a year, but soon returned to sir William Temple, who wished for his conversation by any sacrifice whatever; and for four years till his death, the greatest harmony prevailed between them. On his friend's death he inherited a legacy from him, and the right of his posthumous works, which he dedicated to the king, in hopes of receiving some preferments, but he was disappointed, and soon after followed as chaplain lord Berkley, one of the justices of Ireland. Here again disappointment followed him; he had been promised the deanery of Derry, but his patron gave it to some greater favourite, and presented him to the livings of Laracor and Rathbeggin. At Laracor he was first visited by the celebrated Stella, daughter of W. Johnson, steward to sir William Temple, who inherited from him, for the services of her father, a legacy of 1000*l.* This lady, whom Swift had seen at the house of his former patron, came to Ireland at his invitation, and as she was but 18 she was accompanied by Mrs. Dingley, 15 years older. These two ladies lived with Swift on terms of intimacy, but without scandal: in his absence they resided at the parsonage, but on his return they removed to their lodgings, and they never met but in the company of a third person. In 1701 he took his doctor's degree, and after the death of king William, he came to England occasionally. He became acquainted with Harley, and the leading members of the ministry, and so gained their confidence, that he was considered as capable, not only of defending, but almost of guiding the public measures. Though thus courted, he did not receive any preferment before 1713, when he was made dean of St. Patrick. A bishopric had been intended for him by the queen; but on the representation of Sharp, who declared him to be a man whose christianity was questionable, his name was passed by. Soon after he returned to England, to reconcile Harley and St. John, whose enmity seemed to threaten destruction to the ministry, but in vain. After the death of Anne, he had little connection with the leading men of England; but, though unpopular in Ireland, his patriotism restored him to the public favour. When Wood obtained a patent to coin 180,000*l.* in copper, for Ireland, which, in enriching the projector, would have ruined the people, the dean opposed the plan, and by the publication of his Drapier's letters, he prevailed upon the public to reject the money. Thus successful, he became the oracle of Ireland, and nothing was adopted either in Dublin or in the country, without previously knowing the sentiments of the dean. The last period of his life was spent in retirement. In 1736 he lost his memory, and as his temper was naturally irascible, he grew violent, so that few of his friends visited him. In 1741 his infirmities were such that he was unfit for conversation, and the next year he became delirious, and at times sunk into such insensibility, that for a whole year he never spoke. After short intervals of reason, he gradually declined, and at last died at the end of October 1745, aged 78, apparently without a pang. Among the singularities of this extraordinary character, his conduct to Stella deserves reprobation. After an intimate friendship of more than 16 years, he in 1716 married her, but still no alteration took place in their mode of living, and she never resided in his house except when fits of giddiness or deafness made her presence necessary. He never acknowledged her as his wife, though she always presided at his table; and this cruel conduct at last broke her heart. (See JOHNSON, Mrs.) But not only Stella experienced the coldness and cruelty of Swift. In his excursions in England, he became acquainted with Mrs. Vanhomrigh, and her two daughters, with the eldest of whom he conversed frequently on literary subjects. From an occasional instructor, he became in the eye of the lady an object of admiration and of love, and she at last ventured to propose marriage to him. He affected to ridicule her on her choice, but without a direct refusal, he indulged her hopes by the frequency of his correspondence. In 1714, this lady, better known under the name of Vanessa, passed into Ireland with her sister, and fixed her residence in his neighbourhood, and at last in 1717 she solicited him not to trifle with her affections, but to declare whether he would accept or refuse her for a wife. The dean, who had hitherto sported with her feelings, wrote an answer to her letter, probably intimating his marriage, and delivered it with his own hands. Vanessa read it, and survived the shock only a few weeks; but before she expired, she altered her will, and left to the bishop of Cloyne and serjeant Marshall the property which she had designed for her cruel lover. The works of Swift evince great power. He wrote poems, which often possess elegance and beauty, but their humour is as often coarse and licentious. His political writings are in a forcible and argumentative style, and when published they had a strong effect on the public opinion, and obtained for the author the admiration and applause of the great parliamentary leaders of the time. His Gulliver's Travels, a satirical romance, and his Tale of a Tub, in which he ridiculed popery and puritanism, were very popular works, and are still read with admiration. In his political principles he was a tory, and ably defended the succession of a protestant monarch to the throne. As the friend of Oxford, Pope, Addison, Congreve, Steele, Rowe, &c. he was universally respected for the importance which his opinion acquired in the public esteem, and wherever he appeared he was courted and respected as a pleasing companion, and a man of information. Though a great humourist, and an excellent punster, he preserved delicacy in his conversation, and was best pleased when ladies were present, as he observed that they would banish whatever was indecorous, profane, or vulgar. As an ecclesiastic he was punctually exact; but we have heard nothing of his fervour or his zeal: as a man of the world he regarded wealth as the proof of independence, and often made his frugality subservient to his avarice. He left 11,000*l.* for the endowment of an hospital for idiots and lunatics, in the city of Dublin. His works have been published in 14 vols. 4to. also in 25 vols. 8vo. &c.

SWI'FTLY. *ad.* (from *swift.*) Fleetly; rapidly; nimbly; with celerity (*Prior*).

SWI'FTNESS. *s.* (from *swift.*) Speed; nimbleness; rapidity; quickness; velocity; celerity (*Denham*).

To SWIG. *v. n.* (*swiga*, Islandic.) To drink by large draughts.

To SWILL. *v. a.* (ꞅpılᵹan, Saxon.) 1. To drink luxuriously and grossly (*Shakspeare*). 2. To wash; to drench (*Philips*). 3. To inebriate (*Dryden*).

SWILL. *s.* (from the verb.) Drink luxuriously poured down (*Mortimer*).

SWI'LLER. *s.* (from *swill.*) A luxurious drinker.

To SWIM. *v. n.* preterit *swam*, *swom*, or *swum*. (ꞅpımman, Sax. *swemmen*, Dutch.) 1. To float on the water; not to sink (*Bacon*). 2. To move progressively in the water by the motion of the limbs (*Knolles*). 3. To be conveyed by the stream (*Dryden*). 4. To glide along with a smooth or dizzy motion (*Smith*). 5. To be dizzy; to be vertiginous (*Dryden*). 6. To be floated (*Addison*). 7. To have abundance of any quality; to flow in any thing (*Addison*).

To SWIM. *v. a.* To pass by swimming (*Dryden*).

SWIM. *s.* (from the verb.) The bladder of fishes by which they are supported in the water (*Grew*).

SWI'MMER. *s.* (from *swim.*) 1. One who swims (*Bacon*). 2. The swimmer is situated in the fore legs of a horse, above the knees, and upon the inside, and almost upon the back parts of the hind legs, a little below the ham: this part is without hair, and resembles a piece of hard dry horn (*Farrier's Dict.*).

SWIMMING or FLOATING LEAF, in botany. Natans. Lying on the surface of the water.

SWI'MMINGLY. *ad.* (from *swimming.*) Smoothly; without obstruction (*Arbuthnot*).

SWINDLER, a word which has been lately adopted into the English language, derived from the German word *schwindel*, to cheat. Swindling has now become so common in several of the great towns of this country, that it is unfortunately too well known to require any description.

SWINDON, a town in Wiltshire, with a market on Monday, seated on the top of a hill, near a rich vale, 28 miles N. of Salisbury, and 83 W. of London. Lon. 1. 45 W. Lat. 51. 30 N.

SWINE. *s.* singular and plural. See SUS.

SWINE-HERD. *s.* A keeper of hogs.

SWINE-STONE, in mineralogy, a genus of earths, comprising a great variety of the black marbles in statuary use. See SUILLUS.

To SWING. *v. n.* (ꞅpınᵹan, Saxon.) 1. To wave to and fro hanging loosely (*Gay*). 2. To fly backward and forward on a rope.

To SWING. *v. a.* preterit *swang*, *swung*. 1. To make to play loosely on a string. 2. To whirl round in the air (*Milton*). 3. To wave loosely (*Dryden*).

SWING. *s.* (from the verb.) 1. Motion of any thing hanging loosely (*Locke*). 2. A line on which any thing hangs loose. 3. Influence or power of a body put in motion (*Brown*). 4. Course; unrestrained liberty (*Chapman*). 5. Unrestrained tendency (*South*).

To SWINGE. *v. a.* (ꞅƿınᵹan, Saxon.) 1. To whip; to bastinade; to punish (*Shak.*). 2. To move as a lash: not in use (*Milton*).

SWINGE. *s.* (from the verb.) A sway; a sweep of any thing in motion (*Waller*).

SWI'NGEBUCKLER. *s.* (*swinge* and *buckler.*) A bully; a man who pretends to feats of arms (*Shakspeare*).

SWI'NGER. *s.* (from *swing.*) He who swings; a hurler.

SWI'NGING. *a.* (from *swinge.*) Great; huge. A low word (*L'Estrange*).

SWI'NGINGLY. *ad.* (from *swinging.*) Vastly; greatly (*Swift*).

To SWI'NGLE. *v. n.* (from *swing.*) 1. To dangle; to wave hanging. 2. To swing in pleasure.

SWI'NISH. *a.* (from *swine.*) Befitting swine; resembling swine; gross; brutal (*Milton*).

To SWINK. *v. n.* (ꞅƿıncan, Saxon.) To labour; to toil; to drudge: obsolete (*Spenser*).

To SWINK. *v. a.* To overlabour (*Milton*).

SWINK. *s.* (ꞅƿınc, Saxon.) Labour; toil; drudgery: obsolete (*Spenser*).

SWINNA, a little island of Scotland, one of the Orkneys, situate to the N.E. of that called Mainland. Here are two whirlpools, that have been known to draw in boats and light vessels, which are instantly swallowed up.

SWISSERLAND, or SWITZERLAND, a country of Europe, bounded on the E. by Tyrol, on the W. by France, on the N. by Suabia, and on the S. by Savoy and Italy. It is 225 miles long and 83 broad, separated from the adjacent countries by high mountains, called the Alps. Swisserland is divided into 13 cantons, exclusive of their allies; namely, Lucern, Uri, Schweitz, Underwalden, Zug, Friburg, and Soleure, which are catholics. The protestant cantons are Zuric, Bern, Basle, and Schaffhausen. Glarus and Appenzel contain both religions. There are four passages over the Alps into Italy from Swisserland; the first of which is beyond the lake of Geneva over mount Cennis, which leads to Savoy; the second begins in the country of the Grisons, and crosses Mount St. Bernard, leading to the valley of Aousta, which belongs to Piedmont; the third begins in the country of the Grisons, crosses Mount Simpleberg, and leads to the duchy of Milan; the fourth crosses Mount St. Gothard, and the bailiwics of Italy, and terminates in the Milanese. The principal lakes are those of Constance, Geneva, Lucern, Zuric, and Neuchatel. The most considerable rivers are the Rhine, Rhone, Aar, Arve, Reuss, and Inn. The chief riches of Swisserland consist of excellent pastures in which many cattle are bred and fattened, and the goats, and chamois, feed on the mountains, and in the woods. The men are all strong and robust, for which reason they are preferred by several nations for the military service. The women are tolerably handsome, have many good qualities, and are in general very industrious. The peasants retain their old manner of dress, and are content to live upon milk, butter, and cheese; and there are some of the mountaineers who never have any bread. In 1797, the partisans of France having excited disputes and disturbances in Swisserland, the French entered the country; and, after defeating the troops and peasants, who opposed them, in several battles, they abolished the constitutions of the principal cantons, and erected what was termed the Helvetic republic, with a form of government like that of France, composed of a legislative body, consisting of two councils and a directory. On the recommencement of the war with the emperor of Germany in 1799, the archduke Charles entered Swisserland, defeated the French, and made himself master of Schaffhausen and Zuric; but at the close of the campaign, he was obliged to evacuate the country, which is at present in a very exhausted and impoverished state. The first consul of France presented the Swiss with a constitution for their acceptance in 1802, which they rejected. In 1803 he presented to them another, which they accepted. By this constitution the country is divided into 19 cantons; of which the general government is by a diet, composed of a member from each canton. This diet assembles annually in June at Friburg, Bern, Soleure, Basil, Zurich, and Lucern, in rotation; and the president is styled landamman of Swisserland.

SWITCH. *s.* A small flexible twig (*Add.*).

To SWITCH. *v. a.* (from the noun.) To lash; to jerk (*Chapman*).

SWI'VEL. *s.* Something fixed in another body so as to turn round in it.

SWIVEL-CANNON, is a small piece of artillery belonging to a ship of war, which carries a shot of half a pound, and is fixed in a socket on the top of the ship's side, stern, or bow, and also in her tops. The trunnions of this piece are contained in a sort of iron crotch, of which the lower end terminates in a cylindrical pivot resting in the socket, so as to support the weight of the cannon. The socket is bored in a strong piece of oak, reinforced with iron hoops, in order to enable it to sustain the recoil. By means of this frame, which is called the swivel, and an iron handle on its cascable, the gun may be directed by the hand to any object, it is therefore very necessary in the tops, particularly when loaded with musket-balls, to fire down on the upper decks of the adversary in action.

SWO'BBER. *s.* (See SWABBER.) 1. A sweeper of the deck (*Dryden*). 2. Four privileged cards that are only incidentally used in betting at the game of whist (*Swift*).

SWO'LLEN. Swoln. The participle pass. of *swell*.

SWOM. The preterit of *swim*.

To SWOON. *v. n.* (aꞅpunan, Saxon.) To suffer a suspension of thought and sensation; to faint (*Prior*).

Swoon. *s.* (from the verb.) A lypothymy; a fainting fit.

To SWOOP. *v. a.* (I suppose formed from the sound.) 1. To seize by falling at once as a hawk upon his prey (*Dryden*). 2. To prey upon; to catch up (*Glanville*).

Swoop. *s.* (from the verb.) Fall of a bird of prey upon his quarry (*L'Estrange*).

To SWOP. *v. a.* To change; to exchange one thing for another. A low word (*Dryden*).

SWORD. *s.* (ꞅpeoꞃꝺ, Sax. *sweerd*, Dutch.) 1. A weapon used either in cutting or thrusting; the usual weapon of fights hand to hand (*Broome*). 2. Destruction by war (*Deut.*). 3. Vengeance of justice (*Dryden*). 4. Emblem of authority (*Hudibras*).

Sword of state, which is borne before the king, lords, and governors of counties, cities, or boroughs, &c. For or before the king, it ought to be carried upright; the hilt as low as the bearer's waist, the blade up between his eyes. For or before a duke, the blade must decline from the head, and carried between the neck and the right shoulder. For or before an earl, the blade is to be carried between the point of the shoulder and the elbow: and for or before a baron, the blade is to be borne in the bend of the arm. This ceremonial form no less denotes the dignity of a governor than the coronet set on his coat of arms.

Sword (Broad). An original weapon of Scotland: it is sometimes called a back sword, as having but one edge: it is basket-handled, and three feet two inches long.

Sword (Regulation). The sword which is worn by British officers may be properly called a long cut-and-thrust. It is a manifest imitation of the Austrian sword, and has been lately introduced. It is not, however, so conveniently used by us as it is by the Austrians. The latter have it girted round their waists, so that it hangs without any embarrassment to the wearer close to the left hip or thigh; whereas with us, it is suspended in an awkward diagonal manner from a cross belt over the loins.

Sword (Position of), at open order. When an officer stands or marches in front of his company, &c. the position of the sword is diagonal across the chest. At close order, or when the officer is on the flank of his company, &c. the hilt is close to the right thigh, and the blade in the hollow of the right shoulder. When mounted, he carries it diagonally across the bridle-hand.

When troops or squadrons of cavalry advance, in the walk, the sword is carried with the blade resting on the right arm; in the trot and gallop, the right hand must be steadied on the right thigh, the point of the sword rather inclining forward; and in the charge, the hand is lifted, and the sword is carried rather forward, and crossways in front of the head, with the edge outwards.

Sword-fish, in ichthyology. See Xiphias.

Sword-shaped, in botany. See Ensiform.

SWO'RDED. *a.* (from *sword.*) Girt with a sword (*Milton*).

SWO'RDER. *s.* (from *sword.*) A cut-throat; a soldier: in contempt (*Shakspeare*).

SWO'RDKNOT. *s.* (*sword* and *knot.*) Riband tied to the hilt of the sword (*Pope*).

SWO'RDLAW. *s.* Violence; the law by which all is yielded to the stronger (*Milton*).

SWO'RDMAN. *s.* (*sword* and *man.*) Soldier; fighting man (*Shakspeare*).

SWO'RDPLAYER. *s.* (*sword* and *play.*) Gladiator; fencer (*Hakewill*).

SWO'RE. The preterit of *swear*.

SWORN. The participle passive of *swear*.

SWUM. The pret. and part. pass. of *swim*.

SWUNG. The pret. and part. pass. of *swing*.

SYB. *a.* (properly *sib*; ꞅib, Sax.) Related by blood (*Spenser*).

SYBARIS, a river of Lucania in Italy, whose waters were said to render men more robust. There was a town of the same name on its banks, which in its most flourishing situation had the command of 25 towns, and could send an army of three hundred thousand men into the field. In a more recent age, the inhabitants became so effeminate, that the word Sybarite became proverbial to intimate a man devoted to pleasure. Sybaris was destroyed no less than five times, and always repaired.

SYCAMORE TREE. See Acer.

Sycamore fig See Ficus.

SY'COPHANT. *s.* (συκοφάντης.) A talebearer; a makebate; a malicious parasite (*South*).

To Sy'cophant. *v. n.* (συκοφαντέω.) To play the sycophant (*Gov. of the Tongue*).

SYCOPHA'NTIC. *a.* (from *sycophant.*) Talebearing; mischievously officious.

To SY'COPHANTISE. *v. n.* (συκοφαντικος; from *sycophant.*) To play the talebearer.

SYDENHAM (Dr. Thomas), an excellent English physician, was the son of William Sydenham of Winford Eagle in Dorsetshire, and was born there about the year 1624. He studied at Magdalen-hall, Oxford; but left that university when Oxford was garrisoned for king Charles I. and went to London: where, becoming acquainted with Dr. Thomas Cox, an eminent physician, that gentleman persuaded him to apply himself to the study of physic; accordingly, after the garrison was delivered up to the parliament, he retired again to Magdalen-hall, entered on the study of medicine, and in 1648 was created bachelor of physic. Soon after, he was made a fellow of All-Souls college, and continued there several years: when, leaving the university, he settled at Westminster, became doctor of his faculty at Cambridge; grew famous for his practice; and was the chief physician in London from the year 1660 to 1670; at which period he began to be disabled by the gout. He died in 1689. His works are highly esteemed both at home and abroad. He was famous for his cool regimen in the small-pox; for giving the bark after the paroxysm in agues; and for his use of laudanum. He regulated his practice more by his own observations and inquiries than by the method either of his predecessors or contemporaries.

SYDNEIA. Sydney or Sidney earth. In mineralogy, a species of barytes of the class earths, order ponderous. Consisting of barytes or ponderous earth, alumina, fine sand, and some colourless mica: soluble in heated muriatic acid only; the solution not crystallizing, but becoming a butyraceous and deliquescent mass; melts in a heat of 15 degrees of Wedgewood. Found in Sydney Cove in New South Wales, white, with sometimes a few black particles resembling black lead; the butyraceous mass from the solution is pale yellow, and not corrosive.

SYDNEY BAY, a bay on the S. side of Norfolk Island, in the Pacific Ocean, formed by Point Hunter and Point Ross, which are near two miles asunder. Here is a settlement of convicts, from England. Lon. 168. 12 E. Lat. 29. 4 S.

SYDNEY COVE, the town or settlement of convicts, founded at Port Jackson, in New S. Wales, in 1788. The ground about it was then covered by a thick forest; but, in 1790, some good buildings had been erected, and greatest part of the civil and military officers were comfortably lodged. The governor's house is built of stone, and has a very good appearance, being 70 feet in front. The lieutenant-governor's house is of brick, as are also those belonging to the judge and the commissary. The rest of the houses are built with logs and plastered, and all the roofs are either covered by shingles, or thatched. Lon. 151. 28 E. Lat. 33. 50 S.

SYENA, in botany, a genus of the class triandria, order monogynia. Calyx three-leaved; petals three; anthers oblong; capsule one-celled, three-valved. One species only, a native of Guiana: a minute plant growing in its rivers, with decumbent stem, capillary, whorled leaves; axillary, solitary, white, peduncled flowers.

SYENE, a town of Thebais, on the extremities of Egypt. Juvenal, the poet, was banished there on pretence of commanding a prætorian cohort stationed in the neighbourhood. It was famous for its quarries of marble.

SYLLA (L. Cornelius), a celebrated Roman of a noble family. He first entered the army under the great Marius, whom he accompanied in Numidia, in the capacity of questor. He left him, and carried arms under Catulus. Some time after, he was appointed by the Roman senate to place Ariobarzanes on the throne of Cappadocia, against the views and interest of Mithridates, king of Pontus. This he easily effected, and before he quitted Asia he received in his camp ambassadors from the king of Parthia, to treat of an alliance with the Romans. Having been opposed by Marius in his wishes to take the administration of the Mithridatic war as consul, after subduing the Marsi, he entered Rome, sword in hand, slaughtered all his enemies, set a price upon the head of Marius, put to death the tribune Sulpitius, and marched towards Asia. When he reached the coast of Peloponnesus, he was delayed by the siege of Athens, and of the Piræus. He made no scruple to take the riches of the temples of the gods, to bribe his soldiers, and render them devoted to his service. His boldness succeeded, the Piræus surrendered; and as if struck with reverence at the beautiful porticoes where the philosophic followers of Socrates and Plato had often disputed, he spared the city of Athens, which he had devoted to destruction, and forgave the living for the sake of the dead. Two celebrated battles, at Cheronæa and Orchomenos, rendered him master of Greece. He crossed the Hellespont, and attacked Mithridites in the very heart of his kingdom. The monarch made proposals of peace, Sylla accepted them, and returned to Rome to dispute with his rival the sovereignty of the republic with a victorious army. Muræna was left at the head of the Roman forces in Asia, and Sylla hastened to Italy. Notwithstanding the alarming accounts he had heard on the way of the strength and success of his rivals, he was not in the least discouraged, but artfully proposing terms of accommodation to his adversaries, he secretly strengthened himself, and saw his armies daily increase, by the revolt of soldiers whom his bribes or promises had corrupted. Pompey embraced his cause, and marched to his camp with three legions. Soon after he appeared in the field with advantage; the confidence of Marius decayed with his power, and Sylla entered Rome like a tyrant and a conqueror. The streets were daily filled with dead bodies, and 7000 citizens, to whom the conqueror had promised pardon, were suddenly massacred in the circus. The senate, at that time assembled in the temple of Bellona, heard the shrieks of their dying countrymen; and when they enquired into the cause of it, Sylla coolly replied, "They are only a few rebels whom I have ordered to be chastised." No less then 4700 of the most powerful and opulent were slain, and Sylla wished the Romans to forget his cruelties in aspiring to the title of perpetual dictator. In this capacity he made new laws, abrogated such as were inimical to his views, and changed every regulation where his ambition was obstructed. After he had finished whatever the most absolute sovereign may do, from his own will and authority, Sylla abdicated the dictatorial power, and retired to a solitary retreat at Puteoli, where he spent the rest of his days. His intemperance hastened his end, his blood was corrupted, and an imposthume was bred in his bowels. He at last died in the greatest torments of the lousy disease, about 78 years before Christ, in the 60th year of his age; and it has been observed, that like Marius, on his death-bed, he wished to drown the stings of conscience and remorse by being in a continual state of intoxication. The character of Sylla is that of an ambitious, dissimulating, credulous, tyrannical, debauched, and resolute commander. He was revengeful in the highest degree, and the sirname of Felix, or the fortunate, which he assumed, showed that he was more indebted to fortune than to valour for the great fame he had acquired. He patronised the arts and sciences; he brought from Asia the extensive library of Apellicon, the peripatetic philosopher, in which were the works of Aristotle and Theophrastus; and he himself composed 22 books of memoirs concerning himself.

SYLLA'BICAL. Sylla'bic. *a.* (*syllabique*, Fr. from *syllable.*) Relating to syllables; consisting of syllables.

SYLLA'BICALLY. *ad.* (from *syllabical.*) In a syllabical manner.

SY'LLABLE. *s.* (συλλαϐη.) 1. As much of a word as is uttered by the help of one vowel, or one articulation (*Shakspeare*). 2. Any thing proverbially concise (*Swift*).

The longest syllable in the English language is the word *strength.*

To Sy'llable. *v. a.* (from the noun.) To utter; to pronounce: not in use (*Milton*).

SY'LLABUB. *s.* (rightly Sillabub, which see.) Milk and acids (*Beaumont*).

SY'LLABUS. *s.* (συλλαϐος.) An abstract; a compendium containing the heads of a discourse.

SY'LLOGISM. *s.* (συλλογισμος.) An argument composed of three propositions; as, *every man thinks*; *Peter is a man, therefore Peter thinks.* See Logic.

SYLLOGI'STICAL. Syllogi'stic. *a.* (συλλογιϛικος.) Relating to a syllogism; consisting of a syllogism (*Watts*).

SYLLOGI'STICALLY. *ad.* (from *syllogistical.*) In the form of a syllogism (*Locke*).

To SY'LLOGIZE. *v. n.* (συλλογιζειν.) To reason by syllogism (*Watts*).

SYLPHIUM. Asafœtida is so termed by by some writers. See Asafœtida.

SY'LVAN. *a.* (better *silvan.*) Woody; shady; relating to woods (*Milton*).

Sy'lvan. *s.* (*sylvain*, Fr.) A wood god, or satyr. See Silvanus.

SYLVANITE, in mineralogy. See Tellurium.

SYLVIA, or Ilia, the mother of Romulus. See Rhea.

SYLVIUS, a son of Æneas by Lavinia, from whom afterwards all the kings of Alba were called Sylvii.

SY'MBOL. *s.* (*symbole*, Fr. συμϐολον.) 1. An abstract; a compendium; a comprehensive form (*Baker*). 2. A type; that which comprehends in its figure a representation of something else (*Addison*).

SYMBO'LICAL. *a.* (*symbolique*, Fr. συμϐολικος.) Representative; typical; expressing by signs; comprehending something more than itself (*Taylor*).

SYMBO'LICALLY. *ad.* (from *symbolical.*) Typically; by representation (*Brown*).

SYMBOLIZA'TION. *s.* (from *symbolize.*) The act of symbolizing; representation; resemblance (*Brown*).

To SY'MBOLIZE. *v. n.* (*symboliser*, Fr.) To have something in common with another by representative qualities (*South*).

To Sy'mbolize. *v. a.* To make representative of something (*Brown*).

SYMBLEPHARUM. (συμϐλεφαρον, from συν, with, and βλεφαρον, the eyelid.) A concretion of the eyelid to the globe of the eye; also a concretion of the palpebræ with the eye. This chiefly happens in the superior, but very rarely in the inferior palpebræ.

The causes of this concretion are a bad conformation of the parts, or from ulcers of the cornea, the membrana conjunctiva, or internal superficies of the palpebræ, or imprudent scarifications, or burns, especially if the eye remains long closed.

There are two species, the partial or total; in the former the adhesion is partial, in the latter, the membrana conjunctiva and cornea are concreted together.

SYMME'TRIAN. *s.* (from *symmetry.*) One eminently studious of proportion (*Sidney*).

SYMME'TRICAL. *a.* (from *symmetry.*) Proportionate; having parts well adapted to each other.

SY'MMETRIST. *s.* (from *symmetry.*) One very studious or observant of proportion (*Wotton*).

SY'MMETRY. *s.* (*symmetrie*, Fr. συν and μετρον.) Adaptation of parts to each other; proportion; harmony; agreement of one part to another (*Dryden*).

SYMPASM. Sympasma. (from συμπασσω, to sprinkle over.) An aspersion or sprinkling, as of cold water over the body in the case of scarlatina and other typhoid fevers.

SYMPATHE'TICAL. Sympathe'tic. *a.* (*sympathetique*, Fr.) Having mutual sensation; being affected by what happens to the other; feeling in consequence of what another feels (*Roscommon*).

SYMPATHETIC NERVE. Intercostal nerve. See Intercostal.

SYMPATHE'TICALLY. *ad.* (from *sympathetic.*) With sympathy; in consequence of sympathy.

To SY'MPATHIZE. *v. n.* (*sympathiser*, Fr. from *sympathy.*) To feel with another; to feel in consequence of what another feels; to feel mutually (*Locke*).

SY'MPATHY. *s.* (*sympathie*, Fr. συμπαθεια.) Fellow-feeling; mutual sensibility; the quality of being affected by the affection of another (*South*).

Sympathy. (Συμπαθεια, from συμπασχω, to suffer together, to sympathise.) All the body is sympathetically connected together, and dependent, the one part upon the rest, constituting a general sympathy. But sometimes we find particular parts more intimately dependent upon each other than upon the rest of the body, constituting a particular sympathy. Action cannot be greatly increased in any one organ, without being diminished in some other;

But certain parts are more apt to be affected by the derangement of particular organs than others; and it was the observance of this fact which gave foundation to the old and well known doctrine of sympathy, which was said to proceed, *tum ob communionem et similitudinem generis, tum ob viciniam*. It may be thought that this position of action being diminished in one organ, by its increase, either in the rest or in some other part, is contradicted by the existence of general diseases or actions affecting the whole system. But in them we find, in the first place, that there is always some part more affected than the rest. This local affection is sometimes the first symptom, and affects the constitution in a secondary way, either by the irritation which it produces, or by an extension of the specific action. At other times the local affection is coeval with the general disease, and is called sympathetic; in the second, idiopathic. It is observed in the second place, that as there is some part which is always more affected than the rest, so also is there some organ which has its action, in consequence of this, diminished lower than that of the rest of the system, and most commonly lower than its natural standard. From the extensive sympathy of the stomach with almost every part of the body, we find that this most frequently suffers, and has its action diminished in every disease, whether general or local, provided that the diseased action arises to any considerable degree. There are also other organs which may, in like manner, suffer from their association or connection with others which become diseased, as will be immediately explained. Thus, for instance, we see, in the general disease called puerperal fever, that the action of the breasts is diminished by the increased inflammatory action of the uterus.

In consequence of this balance of action, or general connection of the system, a sudden pain, consequent to violent action of any particular part, will so weaken the rest as to produce fainting, and occasionally death. But this dependence appears more evidently in what may be called the smaller systems of the body, or those parts which seem to be more intimately connected with each other than they are with the general system. Of this kind is the connection of the breasts with the uterus of the female; of the urethra with the testicles of the male; of the stomach with the liver; and of the intestines with the stomach, and of this again with the brain; of the one extremity of the bone with the other; and of the body of the muscle with its insertion; of the skin with the parts below it.

These smaller systems or circles shall be treated regularly; but, first, it may be proper to observe that these are not only intimately connected with themselves, but also with the general system, an universal sympathy being thus established.

That there is a very intimate connection between the breasts and uterus has been long known; but it has not been very satisfactorily explained. Fallopius, and all the older authors, declare plainly that the sympathy is produced by an anastomosis of vessels; Bartholin adding, that the child being born, the blood no longer goes to the uterus, but is directed to the breasts, and changed into milk. But none of all those who talk of this derivation assign any reasonable cause which may produce it.

In pregnancy, and at the menstrual periods, the uterus is active; but, when the child is delivered, the action of the uterus subsides, whilst the breasts in their turn become active, and secrete milk.

If, at this time, we should again produce action in the uterus, we diminish that of the breasts, and destroy the secretion of milk, as is well illustrated by the case of inflammation of the uterus, which is incident to lying-in women. When the uterus, at the cessation of the menses, ceases to be active, or to secrete, we often find that the breasts have an action excited in them, becoming slowly inflamed, and assuming a cancerous disposition. The uterus and breasts seem to be a set of glands balancing each other in the system, one only being naturally active, or secreting properly at a time; and accordingly we seldom, if ever, find that when the uterus yields the menstrual discharge, the milk is secreted in perfection, during the continuance of this discharge, nor do we ever find them both inflamed at the same time.

The uterus has not only this connection with the breasts, but it has also a very particular sympathy with the stomach, which again sympathises with the brain; and thus we see how a disorder of the uterus may induce an extensive series of affections, each dependent on the other. The uterus has been known, ever since the foundation of physic, to produce very extensive disease in the nervous system; and it is amusing to hear how this was explained. The disease called suffocation of the uterus, with many other hysterical ailments, were attributed to the swelling or choking up of the uterus, by winds and vapours generated from the retention of the menses, or by the corruption of the semen, and the putrefaction of the bad humours which came there to be discharged; for this organ was considered by many as a common cloaca.

These ventosities being once generated, it was believed that they mounted up to the stomach, the liver, and at last to the brain. The cure consisted in expelling these; and one of these remedies which was employed for this purpose, was warm aromatic fumes, conveyed by tubes to the os uteri; for there was no safety, they imagined, until the vile stuff was discharged; this "occult odour," as Van Helmont calls it.

The organs of generation in the male form likewise a little system, in which all the parts exhibit this sympathy with each other. They likewise give us a very good instance of the association of action, or sympathy in the common acceptation of that word.

Sympathy has been divided into the contiguous and associate. It will be more conformable to the present doctrine, which is presumed to be true, to divide it into, first, the sympathy of equilibrium in which one part is weakened by the increased action of another; and, second, the sympathy of association in which two parts act together at the same time.

The sympathy of association is produced suddenly, and for a short time. The sympathy of equilibrium is produced more slowly, and continues to operate for a much longer time.

It is curious enough that most, or at least many, of those organs, which seem to be connected by the sympathy of equilibrium, exhibit likewise more or less of the sympathy of association, when under the circumstances in which this can take place.

The sympathy of equilibrium is seen in the effects of inflammation of the end of the urethra on the testicle; which often diminishes its action, and produces a very disagreeable sensation of dulness, or if this inflammation be suddenly diminished, the action of the testicle is as suddenly increased, and swelling takes place. The same is seen in the connection of the urethra with the bladder and prostate gland, as is mentioned in all the dissertations on gonorrhœa. These parts likewise affect the stomach greatly, increased action in them weakening that organ much. This is seen in the effects of swelled testicle or excessive venery, or inflamed bladder, and in stone; all which weaken the stomach, and produce dyspepsia. The same remark applies to the kidney; vomiting and flatulence being produced by nephritis.

The sympathy of association, or an instance of sympathy in the common acceptation of the word, is likewise seen in the connection betwixt the glans and testicles in coition; but for this purpose, the action in the glans must be sudden and of short duration; for if continued long, weakness of the testicles, or diminished action, is induced. In those parts which exhibit this natural association of action, if the action of one part be suddenly and for a short time increased, the action of the sympathising part will likewise be increased; as we see in the instance already given of coition, and likewise in paroxysms of the stone, in which the glans penis, after making water, becomes very painful.

But if the action be more slowly induced, and continued for a long time, then this association is set aside, by the stronger and more general principle of the equilibrium of action, and the sympathising part is weakened. Hence, violent inflammation of the end of the urethra produces a weakness and irritability of the bladder, dulness of the testicles, &c.

There is also an evident sympathy of equilibrium betwixt the stomach and lower tract of intestines; which two portions may be said in general to balance each other in the abdomen. When the action of the intestines is increased in diarrhœa, the stomach is often weakened, and the patient tormented with nausea. This will be cured, not so easily by medicines taken into the stomach, as by anodyne clysters, which will abate the action of the intestines. When the intestines are inflamed, as in strangulated hernia, vomiting is a never-failing attendant.

When again the stomach is inflamed, the intestines are affected, and obstinate costiveness takes place; even in hysterical affections of the stomach, the intestines are often deranged. Injections of cold water frequently relieve these affections of the stomach, by their action of the intestines.

The liver and stomach are also connected with one another. When the liver is inflamed, or has its action increased, the stomach is weakened, and dyspeptic symptoms take place. When the stomach is weakened, as, for instance, by intoxication, then the action of the liver is increased, and a greater quantity than usual of bile is secreted. The same takes place in warm climates, where the stomach is much debilitated.

If the liver have its action thus frequently increased, it assumes a species of inflammation, or becomes, as it is called, scirrhus. This is exemplified in the habitual dram-drinkers, and in those who stay long in warm countries and use freedoms with the stomach. The liver likewise sympathises with the brain; for when this organ is injured and its action much impaired, as in compression, inflammation and suppuration have been often known to take place in the liver.

Besides this connection of the stomach with the liver, it is also very intimately dependent on the brain, being weakened when the action of the brain is increased; as we see in inflammation of that organ. The brain again is affected with pain, when the stomach is weakened by intoxication, or other causes; and this pain will be often relieved by slowly renewing the action of the stomach, by such stimuli as are natural to it, such as small quantities of soups frequently repeated. A slight increase of action in the stomach, at least if not of a morbid kind, affects the brain so as to produce sleep, diminishing its action. This we see in the effects of a full meal, and even of a draught of warm water. The stomach likewise sympathises with the throat, squeamishness and anorexia being often produced by inflammation of the tonsils. This inflammation is frequently abated by restoring or increasing the action of the stomach. Hence the throat in slight inflammation is frequently easier after dinner; hence, likewise, the effect of emetics in cynanche.

The extremities of bones and muscles also sympathise in the same manner. When one end of a bone is inflamed, the action of the other is lessened, and pain is produced; for a painful sensation may result both from increased and diminished action. When the tendon of a muscle is inflamed, the body of that muscle often is pained, and *vice versa*.

Lastly, the external skin sympathises with the parts below it. If it be inflamed, as in erysipelas, the parts immediately beneath are weakened, or have their natural action diminished. If this inflammation affect the face or scalp, then the brain is injured; and headache, stupor, or delirium mite, supervene. If it attack the skin of the abdomen, then the abdominal viscera are affected, and we have vomiting and purging or obstinate costiveness, according to circumstances. This is illustrated by the disease of children, which is called by the women the bowel hive, in which the skin is inflamed, as they suppose, from some morbid matter within.

If the internal parts be inflamed, the action of the surface is diminished, and by increasing this action, we can lessen or remove the disease below; as we see daily proved by the good effects of blisters. When the stomach, intestines, or kidney, have been very irritable, a sinapism has been known to act like a charm; and in the deep-seated inflammations of the breasts, bowels, or joints, no better remedy is known after the use of the lancet than blisters.

The utility of issues in diseases of the lungs, the liver, and the joints, is to be explained on the same principle. In these cases we find that issues do little good unless they be somewhat painful, or be in the state of healthy ulcers. An indolent flabby sore, however large the discharge (which is always thin, and accompanied with little action), does no good, but only adds to the misery of the patient. We may, however, err on the other hand by making the issues too painful, or by keeping them active too long, for after they have removed the inflammatory disease below, they will still operate on these parts, lessening their action, and preventing the healing process from going on properly. This is seen in cases of curvature of the spine, where at first the inflammation of the vertebra is diminished by the issues; but if they be kept long open after this is removed, they do harm. We often see the patient recover rapidly after his surgeon has healed the issue in despair, judging that it could do no farther service, but only increase the weakness of his patient.

It is a well established fact, that when any particular action disappears suddenly from a part, it will often speedily affect that organ which sympathises most with the part which was originally diseased.

This is best seen in the inflammatory action, which, as practical writers have well observed, occasionally disappears quickly from the part first affected, and then shews itself in some other.

From the united testimony of all these facts, Mr. Burns of Glasgow maintains the doctrine just delivered, and proposes to introduce it into pathological reasonings. In the whole of the animal economy, we discover marks of the wisdom of the Creator, but perhaps in no part of it more than in this, of the existence of the sympathy of equilibrium, for if a large part of the system were to have its action much increased, and all the other parts to continue acting in the same proportionate degree as formerly, the whole must be soon exhausted; (for increased action would require for its support an increased quantity of energy).

But upon this principle, when action is much increased in one part, it is to a certain degree diminished in some other; the general sum or degree of action in the body is thus less than it otherwise would be, and consequently the system suffers less.

This doctrine of sympathy, extended or modified in some shape or other, has laid the foundation for many physiological and medical theories in the present as well as in former times. Mr. John Hunter's theory is founded entirely upon it; and Dr. Darwin advances a direct claim, but erroneously, to the invention of such a foundation by calling his own, as though primarily and exclusively the sympathetic system.

SYMPHISIS. (συμφασις, from συν, together, and φυω, to grow.) Mediate connection. A genus of the connection of bones, in which they are united by means of an intervening body. It comprehends four species, viz. synchondrosis, syssarcosis, syneurosis, and syndesmosis.

SYMPHONIA, in botany, a genus of the class monadelphia, order pentandria. Calyx five-leaved; corol five-petalled; globular, twisted; style one; berry five-celled, the cells one-seeded. One species only, S. globulifera, a branched tree of Guinea, with oblong, lanceolate, petioled leaves; terminal, few-flowered, sessile umbels; petals incumbent, forming a globe.

SYMPHONIALE, in music, a word frequently prefixed to the old canons, or perpetual fugues, to indicate that they are in unison; i. e. that the second part is to follow the first in the same intervals, and the third to observe the same rule with regard to the second.

SYMPHO'NIOUS. *a.* (from *symphony.*) Harmonious; agreeing in sound (*Milton*).

SYMPHONOI. (Greek. Plu.) In music. The name given by the ancients to concords, and those sounds which so mix and unite that the tone of the lower is scarcely distinguishable from the upper. The unisons, or duplicates of the same sound, were called *homophonoi.*

SYMPHONY. (From the Greek.) The word symphony in the ancient music signifies that union of sounds which forms a concert. When the whole concerted in unison, it was called a symphony; but when one-half of the concertants were in the octave, or double octave, of the other half, it was called antiphony.

At present the word symphony is applied to overtures, and other instrumental compositions, consisting of a variety of movements, and designed for a full band. The introductory, intermediary, and concluding instrumental passages in vocal compositions are also called symphonies. See MUSIC.

SY'MPHYSIS. *s.* (συν and φυω.) A connascency, or growing together; and perhaps is meant of those bones which in children are distinct, but after some years unite and consolidate into one bone (*Wiseman*).

SYMPHYTUM. Comfrey. In botany,

a genus of the class pentandria, order monogynia. Corol with a tubular, swelling border; the throat closed with subulate rays; calyx fived-parted. Three species, as follows, all of which are cultivated.

1. S. officinale. Common comfrey. Leaves ovate-lanceolate, decurrent. Found wild in our wastes; the stem two or three feet high, upright, winged, branched at the top; corol yellowish-white, sometimes purple; the rays downy at the edges. There are many varieties, from variation in the colour of the corol.

2. S. tuberosum. Tuberous-rooted comfrey. Leaves ovate, half-decurrent, the upper ones opposite. Rises a foot and a half high; flowers pale yellow, in loose bunches, the corol stretched farther beyond the calyx than in the preceding. It is found wild in the sandy shades of our own country.

3. S. orientale. Oriental comfrey. Leaves ovate, slightly petioled. Stalks two feet high; blue flowers in bunches like the first, appearing in March, but seldom producing seeds in this country. Found near Constantinople.

SYMPLOCE. (συμπλοκη.) In rhetoric, a figure in which the same word is repeated several times in the beginning and end of a sentence, including the anaphora and epitrophe.

SYMPLOCOS, in botany, a genus of the class polyadelphia, order polyandria. Calyx five-cleft, superior; petals from five to eight, united into a tube at the base; stamens in a quadruple row, growing to the tube of the corol; drupe dry, five-celled. Six species: natives of the West Indies and South America.

SYMPOSIA, nocturnal feasts celebrated among the Athenians. They began with a great supper, and continued until morning amidst goblets flowing with the wines of Thasus and Lesbos. These were in fact miniature exhibitions of the Bacchanalia, with the only difference, that women, who acted such principal parts there, were never admitted to the rites of the Eranes. See ERANES.

SYMPO'SIAC. *a.* (συμποσιακος.) Relating to merrymakings; happening where company is drinking together (*Arbuthnot*).

SY'MPTOM. *s.* (συμπτωμα.) 1. Something that happens concurrently with something else, not as the original cause, nor as the necessary or constant effect (*Blackmore*). 2. A sign; a token (*Swift*).

SYMPTOMA'TICAL. SYMPTOMA'TIC. *a.* (from *symptom.*) Happening concurrently or occasionally (*Wiseman*).

SYMPTOMA'TICALLY. *ad.* In the nature of a symptom (*Wiseman*).

SYNACHIS. (from συναγω, to contract.) Astringents.

SYNAGO'GICAL. *a.* (from *synagogue.*) Pertaining to a synagogue.

SYNAGOGUE, among the Jews, was a place where people met to worship God. Authors are not agreed about the time when the Jews first began to have synagogues:—some will have them as old as the Ceremonial Law, and others fix their beginning to times after the Babylonish captivity. They erected synagogues not only in towns and cities, but also in the country, especially near rivers, that they might have water for their purifications and ceremonious washings. No synagogue was built in any town, unless there were ten persons of leisure in it; but there might be many in one town, or in one quarter of a town, provided it was very populous. Jerusalem is said to have contained 480. The chief things belonging to a synagogue were, 1. The ark or chest, made after the model of the ark of the covenant, containing the Pentateuch. 2. The pulpit and desk in the middle of the synagogue, in which he that was to read or expound the law stood. 3. The seats or pews for the people. 4. The lamps to give light at evening service, and the feast of dedication. 5. Rooms or apartments for the utensils and alms-chests. The synagogue was governed by a council or assembly, over whom was a president, called the ruler of the synagogue. These are sometimes called chiefs of the Jews, the rulers, the priests or elders, the governors, the overseers, the fathers of the synagogue. Service was performed three times a-day, viz. in the morning, in the afternoon, and at night; at the time of morning sacrifice, evening sacrifice, and after the evening sacrifice on Mondays, Thursdays, and Saturdays, there was a more forcible obligation upon the people to attend than upon the other days. There are synagogues at London, Amsterdam, Rotterdam, Avignon, Metz, &c.

SYNALE'PHA. *s.* (συναλοιφη.) A contraction or excision of a syllable in Latin verse, by joining together two vowels in the scanning or cutting off the ending vowel: as, *ill' ego* (*Dryden*).

SYNAPHE. (Greek.) A term applied by the ancient musicians to the conjunction of two tetrachords; or, more properly, it is the resonance of the homologous chords of two conjoint tetrachords. The Greeks reckoned three synaphes: one between the tetrachord of the hypates, and that of the mesis; one between the tetrachord of the mesis and that of the conjunct; and one between the tetrachord of the disjunct and that of the hyperboles.

SYNARTHROSIS. (συναρθρωσις, from συν, together, and αρθρον, a joint.) Immoveable connexion. A genus of connexion of bones, in which they are united together by an immoveable union. It has three species, viz. suture, harmony, and gomphosis. See ANATOMY.

SYNCHONDROSIS. (ςυγχονδρωσις, from συν, with, and χονδρος, a cartilage.) A species of symphysis, in which one bone is united with another by means of an intervening cartilage, as the vertebræ and the bones of the pubis. See ANATOMY.

SYNCHONDROTOMY. (ςυγχονδρωτομια, from συγχονδρωσις, the symphysis of the pubis, and τεμνω, to cut.) The operation of dividing the symphysis of the pubis.

SYNCHRO'NICAL. *a.* (συν and χρονος.) Happening together at the same time (*Boyle*).

SY'NCHRONISM. *s.* (συν and χρονος.) Concurrence of events happening at the same time (*Hale*).

SYNCHYSIS. (συγχυσις, from συγχυω, to confound.) A solution of the vitreous humour into a fine attenuated aqueous fluid.

SYNCIPITIS OSSA. See PARIETAL BONES.

SYNCIPUT. The forepart of the cranium.

SY'NCRONOUS. *a.* (συν and χρονος.) Happening at the same time (*Arbuthnot*).

SYNCOPATION, in music, a term applied to that disposition of the melody, or harmony, of a composition, by which the last note of one bar is so connected with the first note of the succeeding bar, as to form but one and the same sound. Syncopation is also frequently used during the course of a bar, or measure; as when the last note of one of the measures is united to the first note of the succeeding measure; which is also called binding or legato.

Syncopation is likewise used for a driving-note, i. e. when some shorter note at the beginning of a measure, or half measure, is followed by two, three, or more longer notes, before any other occurs equal to that which gave birth to the driving-note, to make the number even. See MUSIC.

SYNCOPE. (συνκοπη, from συν, with, and κοπτω, to cut or strike down.) Animi deliquium. Leipothymia. Fainting or swooning. A genus of disease in the class neuroses and order adynamiæ of Cullen, in which the respiration and action of the heart either cease, or become much weaker than usual, with paleness and coldness, arising from diminished energy of the brain, or from organic affections of the heart. Species: 1. Syncope cardiaca, the cardiac syncope, arising without a visible cause, and with violent palpitation of the heart, during the intervals, and depending generally on some organic affection of the heart or neighbouring vessels: 2. Syncope occasionalis, the exciting cause being manifest.

SYNCOPE ANGINOSA. See ANGINA PECTORIS.

SYNCOPE, signifies also the contraction of a word by cutting off a part in the middle.

SYNDESMOLOGY. (συνδεσμολογια, from συνδεσμος, a ligament, and λογος, a discourse.) The doctrine of the ligaments. See ANATOMY.

SYNDESMO-PHARYNGEUS. See CONSTRICTOR PHARYNGIS MEDIUS.

SYNDESMOSIS. (συνδεσμωσις, from συνδεσμος, a ligament.) That species of symphysis or mediate connexion of bones in which they are united by ligament, as the radius with the ulna.

SYNDIC, in government and commerce, an officer in divers countries entrusted with the affairs of a city, or other community, who calls meetings, makes representations and solicitations to the ministry, magistracy, &c. according to the exigency of the case. The syndic is appointed to answer and account for the conduct of the body, he makes and receives proposals for the advantage thereof, controls and corrects the failings of particular persons of the body, or at least procures their correction at a public meeting. In effect, the syndic is at the same time both the agent and censor of the community.

SYNDICS OF THE PRESS, in our universities, officers appointed by the body to determine what books shall be printed at the university press with the usual drawback upon the duty; also to determine at what price such books shall be sold, &c.

To SY'NDICATE. *v. n.* (συν and δικη.) To judge; to pass judgment on; to censure: not in use (*Hakewill*).

SY'NDROME. *s.* (συνδρομη.) Concurrent action; concurrence (*Glanville*).

SYNE'CDOCHE. *s.* (συνεκδοχη.) A figure by which part is taken for the whole, or the whole for part (*Taylor*).

SYNECDO'CHICAL. *a.* (from *synecdoche.*) Expressed by a synecdoche; implying a synecdoche (*Boyle*).

SYNECHIA. A concretion of the iris with the cornea, or with the capsule of the crystalline lens. The proximate cause is the contact from inflammation or adhesion of these parts, the consequence of inflammation. The remote causes are, a collapsus of the cornea, a prolapsus of the iris, a swelling or tumefied cataract, hypopium, or a natural formation. The species of this disorder are: 1. Synechia anterior totalis, or a concretion of the iris with the cornea. This species is known by every skilful anatomist inspecting the parts. The pupil in this species is dilated or coarctated, or it is found concreted; from hence various lesions of vision. 2. Synechia anterior partialis, when only some part of the iris is accreted. This concretion is observed in one or many places; from hence the pupil is variously disfigured, and an inordinate motion of the pupil is perceived. 3. Synechia anterior composita, when not only the whole iris, but together a prolapsus of the crystalline lens, unites with the cornea. 4. Synechia posterior totalis, or a concretion of the whole uvea, with the ciliary processes and the capsula of the crystalline lens. 5. Synechia posterior partialis, when only some part of the capsula of the crystalline lens is concreted with the uvea and cornea. This accretion is simplex, duplex, triplex, or in many places it may happen. 6. Synechia complicata, with an amaurosis, cataract, mydriasis, myosis, or synezesis.

SYNEUROSIS. (συνευρωσις, from συν, with νευρον, a nerve, because the ancients included membranes, ligaments, and tendons, under the head of nerves.) A species of symphysis, in which one bone is united to another by means of an intervening membrane.

SYNEZESIS. (συνεζησις, *confidentia.*) A perfect concretion and coarctation of the pupil. It is known by the absence of the pupil, and a total loss of vision. The species are: 1. Synizesis nativa, with which infants are sometimes born. In this case, by an error in the first conformation of the pupil, there is no perforation; it is very rarely found. 2. Synizesis accidentalis, a concretion of the pupil, from an inflammation or exulceration of the uvea or iris, or from a defect of the aqueous or vitreous humour. 3. Synizesis, from a secession of the iris or cornea. From whatever cause it may happen, the effect is certain, for the pupil contracts its diameter; the longitudinal fibres, separated from the circle of the cornea, cannot resist the orbicular fibres: from hence the pupil is wholly or partially contracted. 4. Synizesis complicata, or that which is complicated with an amaurosis, synechia, or other ocular disease. The amaurosis or gutta serena is known by the total absence of light to the retina; we can distinguish this not only by the pupil being closed, but likewise the eyelids, for whether the eyelids be open or shut, all is darkness to the patient. The other complicated cases are known by viewing the eye, and considering the parts anatomically. 5. Synizesis spuria is a closing of the pupil by mucus, pus, or grumous blood.

SYNGENESIA, in botany. (ςυν and γενεςις, congeneration.) The name of the nineteenth class in Linnéus's artificial system; comprehending those plants which have the anthers united into a cylinder.—The orders are six: 1. Polygamia æqualis. 2. Polygamia superflua. 3. Polygamia frustranea. 4. Polygamia necessaria. 5. Polygamia segregata. 6. Monogamia.—The five first orders contain the compound flowers, and form a class truly natural.

SYNGNATHUS. Pipe-fish. In zoology, a genus of the class pisces, order branchiostega. Head small; snout nearly cylindrical, long, turned up at the end; mouth terminal, without teeth or tongue, and furnished with a lid; the lower jaw moveable; gill-covers large, striate, closed; spiracle on the nape tubular; body jointed, mailed, with many-sided scales; without ventral fins. These inhabit the ocean near shores; feed on smaller worms and insects and the spawn of other fishes: under the tail, commencing at the vent, is a longitudinal groove concealing the young and the eggs; eyes small, covered at the sides with a membrane; nostrils near the eyes, and hardly conspicuous; palate smooth; gill-membrane thin, placed on the nape; fins small, thin, the rays undivided; without lateral line. Eight species; inhabitants of the European, Indian, and Mediterranean seas, or around the Cape of Good Hope; four common to our own coasts. We shall give an example or two.

1. S. barbarus. Longer pipe-fish. Without caudal or anal fins; body six-sided. This species is about two feet long, the nose an inch in length, and compressed laterally; the thickest part of the body not exceeding the diameter of a swan's quill; belly carinated, and marked along the middle with a dusky line: it inhabits the European seas, and is found on our own coasts. Colour olive-brown with blueish streaks, and toward the tail with brown spots: pectoral fins twelve rays, anal two, dorsal, two inches long, forty: groove six inches and an half long, covered by two valves. This is the receptacle for the young; and as these animals are viviparous, on treading upon this part, hundreds of living young are seen to creep out around the parent fish. See Nat. Hist. Pl. CLXIX.

2. S. ophidion. Little pipe-fish. Without caudal, anal, and pectoral fins; body round. This species is from one to two feet in length; inhabits the northern European ocean, and is found on our own coasts. It is not viviparous; the groove contains eggs alone, but no young; the eggs are large, yet not numerous.

3. S. acus. Needle-fish. Caudal, anal, and pectoral fins radiate; body seven-sided. Inhabits the northern European ocean, and found on our own coasts; from two to three feet long; body varied with alternate brown and whitish-yellow bands.

4. S. hippocampus. Hippocamp or sea-horse. Without caudal fin; body seven-sided, tuberculate; tail square.

This animal has obtained its name from the resemblance its head bears to that of a horse: it bends the body into different curvatures, like an eel; and is marked all over with circular incisions, resembling those of the insect tribe. It is from nine to twelve inches in length, often less, its thickness not above an inch: the snout oblong, without any fissure at the mouth; at the lower end appear the foramina, with an operculum to cover them. The body is furnished with acculeated knobs, and is of a pentagonal shape, till it reaches the anus, from which, to the tail, it is quadrangular: eyes round and prominent; behind them, in place of the gills, which are here wanting, there are two small fins, resembling the external ears of terrestrial animals. Under the belly there are two orifices; one for voiding the excrement, and the other for the emission of the young in their egg state. Colour dark green, the belly variegated with light blue spots. Inhabits the shores of the Mediterranean, Indian, and Northern seas. See Nat. Hist. Pl. CXC.

SYNNEMENON. (Greek.) The united, or conjunct. The appellation given by the ancient musicians to their third tetrachord, from its beginning the last note of the second tetrachord. When this third tetrachord was, on the contrary, separated from the second, and conjoint with the fourth, it took the name of diezeugmenon.

SYNOCHA. (ςυνοχη, from ςυνεχω, to continue.) Inflammatory fever. A species of continued fever; characterised by increased heat; pulse frequent, strong, hard; urine high-coloured; senses not much impaired. This fever is so named from its being attended with symptoms denoting general inflammation in the system, by which we shall always be able readily to distinguish it from either the nervous or putrid. It makes its attack at all seasons of the year, but is most prevalent in the spring; and it seizes persons of all ages and habits, but more particularly those in the vigour of life, with strong elastic fibres, and of a plethoric constitution. It is a species of fever almost peculiar to cold and temperate climates, being rarely, if ever, met with in very warm ones, except amongst Europeans lately arrived; and even then, the inflammatory stage is of very short duration, as it very soon assumes either the nervous or putrid type.

The exciting causes are sudden transitions from heat to cold, swallowing cold liquors when the body is much heated by exercise, too free a use of vinous and spirituous liquors, great intemperance, violent passions of the mind, the sudden suppression of habitual evacuations, and the sudden repulsion of eruptions. It may be doubted if this fever ever originates from personal infection; but it is possible for it to appear as an epidemic amongst such as are of a robust habit, from a peculiar state of the atmosphere. It comes on with a sense of lassitude and inactivity, succeeded by vertigo, rigors, and pains over the whole body, but more particularly in the head and back; which symptoms are shortly followed by redness of the face and eyes, great restlessness, intense heat, and unquenchable thirst, oppression of breathing, and nausea. The skin is dry and parched; the tongue is of a scarlet colour at the sides, and furred with white in the centre; the urine is red and scanty; the body is costive; and there is a quickness, with a fulness and hardness in the pulse, not much affected by any pressure made on the artery. If the febrile symptoms run very high, and proper means are not used at an early period, stupor and delirium come on, the imagination becomes much disturbed and hurried, and the patient raves violently. The disease usually goes through its course in about fourteen days, and terminates in a crisis, either by diaphoresis, diarrhæa, hœmorrhage from the nose, or the deposit of a copious sediment in the urine; which crisis is usually preceded by some variation in the pulse.

Our judgment as to the termination of the disease must be formed from the violence of the attack, and the nature of the symptoms. If the fever runs high, or continues many days with stupor or delirium, the event may be doubtful; but if to these are added picking at the bed-clothes, startings of the tendons, involuntary discharges by stool and urine, and hiccups, it will then certainly be fatal. On the contrary, if the febrile heat abates, the other symptoms moderate, and there is a tendency to a crisis, we may then expect a recovery. In a few instances, this fever has been known to terminate in mania.

On opening those who die of an inflammatory fever, an effusion is often perceived within the cranium, and now and then, topical affections of some of the viscera are to be observed.

SYNOCHUS. (ςυνοχος, from ςυνεχω, to continue.) A mixed fever. A species of continued fever, commencing with symptoms of synocha and terminating in typhus; so that synocha and typhus, blended together in a slight degree, seem to constitute this species of fever, the former being apt to preponderate at its commencement, and the latter towards its termination.

Every thing which has a tendency to enervate the body may be looked upon as a remote cause of fever; and accordingly we find it often arising from great bodily fatigue, too great an indulgence in sensual pleasures, violent exertion, intemperance in drinking, and errors in diet, and now and then likewise from the suppression of some long accustomed discharge. Certain passions of the mind (such as grief, fear, anxiety, and joy) have been enumerated amongst the causes of fever, and in a few instances it is probable they may have given rise to it; but the concurrence of some other powers seems generally necessary to produce this effect. The most usual and universal cause of this fever is the application of cold to the body; and its morbid effects seem to depend partly upon certain circumstances of the cold itself, and partly upon certain circumstances of the person to whom it is applied.

The circumstances which seem to give the application of cold due effect are its degree of intensity; the length of time which it is applied; its being applied generally, or only in a current of air; its having a degree of moisture accompanying it, and its being a considerable or sudden change from heat to cold. The circumstances of persons rendering them more liable to be affected by cold seem to be debility, induced either by great fatigue or violent exertions, by long fasting, by the want of natural rest, by severe evacuations, by preceding disease, by errors in diet, by intemperance in drinking, by great sensuality, by too close an application to study, or giving way to grief, fear, or great anxiety, by depriving the body of a part of its accustomed clothing, by exposing any one particular part of it, whilst the rest is kept of its usual warmth, or by exposing it generally or suddenly to cold when heated much beyond its usual temperature; these we may therefore look upon as so many causes giving an effect to cold which it otherwise might not have produced. Another frequent cause of fever seems to be breathing air contaminated by the vapours arising either directly or originally from the body of a person labouring under the disease. A peculiar matter is supposed to generate in the body of a person affected with fever, and this floating in the atmosphere, and being applied to one in health, will no doubt often cause fever to take place in him, which has induced many to suppose that this infectious matter is produced in all fevers whatever, and that they are all more or less contagious.

The effluvia arising from the human body, if long confined to one place without being diffused in the atmosphere, will, it is well known, acquire a singular virulence, and will, if applied to the bodies of men, become the cause of fever. Exhalations arising from animal or vegetable substances in a state of putrefaction, have been looked upon as another general cause of fever: marshy or moist grounds, acted upon by heat for any length of time, usually send forth exhalations which prove a never-failing source of fever, but more particularly in warm climates. Various hypotheses have been maintained, with respect to the proximate cause of fever; some supposing it to be a lentor or viscidity prevailing in the mass of blood, and stagnating in the extreme vessels; others, that it is a noxious matter introduced into or generated in the body, and that the increased action of the heart and arteries is the effect of nature to expel the morbific matter; others, that it consisted in an increased secretion of bile; and others again, that it is to be attributed to a spasmodic constriction of the extreme vessels on the surface of the body; which last was the doctrine taught by the late Dr. Cullen.

An attack of fever is generally marked by the patient's being seized with a considerable degree of languor or sense of debility, together with a sluggishness in motion, and frequent yawning and stretching; the face and extremities at the same time become pale, and the skin over the whole surface of the body appears constricted; he then perceives a sensation of cold in his back, passing from thence over his whole frame, and this sense of cold continuing to increase: tremors in the limbs and rigors of the body succeed.

With these there is a loss of appetite, want of taste in the mouth, slight pains in the head, back, and loins, small and frequent respirations. The sense of cold and its effects after a little time become less violent, and are alternated with flushings, and at last, going off altogether, they are succeeded by great heat diffused generally over the whole body; the face looks flushed; the skin is dry, as likewise the tongue; universal restlessness prevails, with a violent pain in the head, oppression at the chest, sickness at the stomach, and an inclination to vomit. There is likewise a great thirst and costiveness, and the pulse is full and frequent, beating perhaps 90 or 100 strokes in a minute. When the symptoms run very high, and there is a considerable determination of blood to the head, a delirium will arise. In this fever, as well as most others, there is generally an increase of symptoms towards evening.

If the disease is likely to prove fatal, either by its continuing a long time, or by the severity of its symptoms, then a starting of the tendons, picking at the bed-clothes, involuntary discharges by urine and stool, coldness of the extremities, and hiccups, will be observed; where no such appearances take place, the disease will go through its course.

As a fever once produced will go on, although its cause be entirely removed, and as the continued or fresh application of a cause of fever neither will increase that which is already produced, nor occasion a new one, there can be no certainty as to the duration of fever, and it is only by attending to certain appearances or changes, which usually take place on the approach of a crisis, that we can form any opinion or decision. The symptoms pointing out the approach of a crisis are the pulse becoming soft, moderate, and near its natural speed; the tongue losing its fur and becoming clean, with an abatement of thirst; the skin being covered with a gentle moisture, and feeling soft to the touch; the secretory organs performing their several offices; and the urine depositing flaky crystals of a dirty red colour, and becoming turbid on being allowed to stand any time.

Many physicians have been of opinion, that there is something in the nature of all acute diseases, except those of a putrid kind, which usually determines them to be of a certain duration, and therefore that these terminations, when salutary, happen at certain periods of the disease rather than at others, unless disturbed in their progress by an improper mode of treatment, or the arising of some accidental circumstance. These periods are known by the appellation of critical days; and from the time of Hippocrates down to the present have been pretty generally admitted. The truth of them, Dr. Thomas, thinks can hardly be disputed, however they may be interrupted by various causes. A great number of phænomena shew us, that both in the sound state and the diseased, nature has a tendency to observe certain periods; for instance, the vicissitudes of sleeping and watching occurring with such regularity to every one; the acute periods that the menstrual flux observes, and the exact time of pregnancy in all viviparous animals, and many other such instances that might be adduced, all prove this law.

With respect to diseases, every one must have observed the definite periods which take place in regular intermittents, as well those universal as topical, in the course of true inflammation, which at the fourth, or at the farthest the seventh day, is resolved, or after this period, changes into either abscess, gangrene, or schirrus, in exanthematous eruptions, which if they are favourable and regular, appear on a certain and definite day; for example, the small-pox about the fourth day. All these appear to be founded on immutable laws, according to which the motions of the body in health and in disease are governed.

The days on which it is supposed the termination of continued fevers principally happens are the third, fifth, seventh, ninth, eleventh, fourteenth, seventeenth, and twentieth.

A simple continued fever terminates always by a regular crisis in the manner before-mentioned, or from the febrile matter falling on some particular parts, it excites inflammation, abscess, eruption, or destroys the patient.

Great anxiety, loss of strength, intense heat, stupor, delirium, irregularity in the pulse, twitchings in the fingers and hands, picking at the bed-clothes, startings of the tendons, hiccups, involuntary evacuations by urine and stool, and such like symptoms, point out the certain approach of death.

On the contrary, when the senses remain clear and distinct, the febrile heat abates, the skin is soft and moist, the pulse becomes moderate and is regular, and the urine deposits flaky crystals, we may then expect a speedy and happy termination to the disease.

The usual appearances which are to be observed on dissection of those who die of this fever are an effusion within the cranium, and topical affections, perhaps of some viscera.

SYNOD, in astronomy, a conjunction or concourse of two or more stars or planets, in the same optical place of the heavens.

Synod signifies also a meeting or assembly of ecclesiastical persons to consult on matters of religion. Of these there are four kinds, viz. 1. General, or æcumenical, where bishops, &c. meet from all nations. These were first called by the emperors, afterwards by christian princes; till in later ages the pope usurped to himself the greatest share in this business, and by his legates presided in them when called. 2. National, where those of one nation only come together, to determine any point of doctrine or discipline. The first of this sort which we read of in England was that of Herudford or Hertford, in 673, and the last was that held by cardinal Pole, in 1555. 3. Provincial, where those only of one province meet, now called the convocation. 4. Diocesan, where those of but one diocese meet, to enforce canons made by general councils, or national and provincial synods, and to consult and agree upon rules of discipline for themselves. These were not wholly laid aside, till by the act of submission, 25 Hen. VIII. c. 19. it was made unlawful for any synod to meet, but by royal authority. See Council and Convocation.

SY′NODAL. Syno′dical. Syno′dic. *a.* (*synodique*, Fr. from *synod.*) 1. Relating to a synod; transacted in a synod (*Stillingfleet*). 2. Reckoned from one conjunction with the sun to another (*Locke*).

Synodals, or Synodies, were pecuniary rents (commonly of two shillings) paid to the bishop, or archdeacon, at the time of their Easter visitation, by every parish priest. They were thus called, because usually paid in synods; because anciently bishops used to visit and hold their diocesan synods once.—For the same reason, they are sometimes also denominated synodalica; but more usually, procurations.

SYNODENDRON, in zoology, a genus of the class insecta, order coleoptera. Antennas clavate, the club lamellate; thorax gibbous, muricate, or unequal; lip filiform, horny, palpigerous at the tip. Four species; all exotics but synodendron cylindricus, with a thorax truncate before, five-toothed; head with an erect horn. The female unarmed.

SYNODICAL MONTH, is the period or interval of time in which the moon passes from one conjunction with the sun to another. This period is also called a lunation, since in this period the moon puts on all her phases, or appearances, as to increase and decrease.—Kepler found the quantity of the mean synodical month to be 29 days, 12 hrs. 44 min. 3 sec. 11 thirds.

SYNO′DICALLY. *ad.* (from *synodical.*) By the authority of a synod or public assembly.

SYNO′NYMA. *s.* (Lat. σύνωνυμος.) Names which signify the same thing.

To SYNO′NYMISE. *v. a.* (from *synonyma.*) To express the same thing in different words (*Camden*).

SYNONYMOUS, is applied to a word or term that has the same import or signification with another. Several works have been composed for the express purpose of explaining synonymous words. In 1777 a work was published on the Latin synonyma at Paris by M. Gardin Dumesnil. The abbé Girard published one on the synonymous terms of the French language many years ago. Another was published on the same subject in the year 1785 by the abbé Robaud. An account of the English synonyma was published by an anonymous author in 1766; which is a close imitation, and in some parts a literal translation, of the abbé Girard's Synonemes François. Trusler also has a work on the same subject, taken almost entirely from Girard. There is likewise a respectable work by Mrs. Piozzi; and some ingenious essays relative to synonyma have been published in the Athenæum.

SYNO′NYMY. *s.* (συνονυμια.) The quality of expressing by different words the same thing.

SYNO′PSIS. *s.* (συνοψις.) A general view; all the parts brought under one view.

SYNO′PTICAL. *a.* (from *synopsis.*) Affording a view of many parts at once.

SYNOVIA. (a term of no radical meaning, coined by Paracelsus.) An unctuous fluid secreted from certain glands in the joint in which it is contained. Its use is to lubricate the cartilaginous surfaces of the articulatory bones, and to facilitate their motions.

SYNOVIAL GLANDS. The assemblage of a fatty fimbriated structure within the cavities of some joints.

SYNTA′CTICAL. *a.* (from *syntaxis*, Lat.) 1. Conjoined; fitted to each other. 2. Relating to the construction of speech.

SY′NTAX. Synta′xis. *s.* (συνταξις.) 1. A system; a number of things joined together (*Glanville*). 2. That part of grammar which teaches the construction of words. See Grammar.

SYNTENOSIS. (σύντενωσις; from σύν, with, and τενων, a tendon.) A species of articulation where the bones are connected together by tendons.

SYNTHESIS. (ςυνθεσις; from ςυντεθημι, to compose.) Combination. See Analysis.

Synthesis denotes a method of composition, as opposed to analysis.

In the synthesis, or synthetic method, we pursue the truth by reasons drawn from principles before established, or assumed, and propositions formerly proved; thus proceeding by a regular chain till we come to the conclusion; and hence called also the direct method, and composition, in opposition to analysis or resolution.

Such is the method in Euclid's Elements, and most demonstrations of the ancient mathematicians, which proceed from definitions and axioms, to prove theorems, &c. and from those theorems proved, to demonstrate others. See ANALYSIS.

SYNTHETICAL METHOD, the method by synthesis, or composition, or the direct method. See SYNTHESIS.

SYPHAX, a king of the Masæsyllii in Libya, who married Sophonisba, the daughter of Asdrubal, and forsook the alliance of the Romans to join himself to the interest of his father-in-law, and of Carthage. He was conquered in a battle by Masinissa, the ally of Rome, and given to Scipio the Roman general. The conqueror carried him to Rome, where he adorned his triumph. Syphax died in prison 201 years before Christ, and his possessions were given to Masinissa.

SYPHILIS. See SIPHILIS.

SYPHON. See SIPHON.

SYRACUSE, a celebrated city of Sicily, founded about 732 years before the Christian era, by Archias, a Corinthian, and one of the Heraclidæ. It was divided into four different districts, which were of themselves separate cities, and it was fortified with three citadels and three-folded walls. It had two capacious harbours separated from one another by the island of Ortygia. The people of Syracuse were very opulent and powerful; it is said that it produced the best and most excellent of men, when they were virtuous, but the most wicked and depraved, when addicted to vicious pursuits. The women of Syracuse were not permitted to adorn themselves with gold, or wear costly garments, except such as prostituted themselves. Syracuse gave birth to Theocritus and Archimedes. It fell into the hands of the Romans, under the consul Marcellus, after a siege of three years, B. C. 212.

Modern Syracuse is a bishop's see, and has a fine harbour, defended by a castle. It was almost ruined by an earthquake in 1693. Near this place, in 1718, there was a sea-fight between the Spaniards and English, in which the former were beaten. It is seated near the sea, 72 miles S. by W. of Messina, and 110 S.E. of Palermo. Lon. 15. 30 E. Lat. 37. 5 N.

SYRIA, also called ASSYRIA, a large country of Asia. It was divided into several districts and provinces, among which were Phœnicia, Palestine, Mesopotamia, Babylon, and Assyria. Syria was subjected to the monarchs of Persia; but after the death of Alexander the Great, Seleucus, sirnamed Nicator, raised it into an empire, known in history by the name of the kingdom of Syria or Babylon, B.C. 312.

SYRIA (Modern), or SURISTAN, a province of Turkey in Asia, bounded on the N. by Diarbeck and Natolia, on the E. by Diarbeck and the deserts of Arabia, on the S. by the same deserts and Judea, and on the W. by the Mediterranean. Under the general name of Syria, was included the ancient Phœnicia, lying S. of Syria Proper. This province abounds in oil, corn, and several sorts of fruits, as well as peas, beans, and all kinds of pulse and garden stuff; but it would produce much more than it does, if it were well cultivated; for there are the finest plains and pastures in the world. The inhabitants have a trade in silk, camlets, and salt. Damascus is the capital.

SYRIÆ OLEUM. A fragrant essential oil, obtained by distilling the canary balsam plant or moldavica.

SYRIAN, a town of Pegu, seated near the bay of Bengal, on a river of the same name, which is one of the extreme branches of the Ava. Lon. 96. 40 E. Lat. 16. 50 N.

SYRIAN HERB MASTICH. See MARUM SYRIACUM.

SYRINGA. Lilac. In botany, a genus of the class diandria, order monogynia. Corol four-cleft; capsule two-celled. Four species.

1. S. vulgaris. Common lilac. Leaves ovate, heart-shaped; flowers white, blue, or deep purple. A native of Persia.

2. S. Chinensis. Chinese lilac. Leaves ovate-lanceolate. Flowers like the last. Supposed to be a native of China.

3. S. Persica. Persian lilac. Leaves lanceolate, entire or cut; of much lower growth than the first; flowers in large panicles at the end of the former year's shoots, of a pale-blue colour and agreeable odour. A native of Persia.

4. S. suspensa. Leaves ovate, serrate, and in threes; calyx deeply divided; corol campanulate. A native of Japan.

SYRINGE, in hydraulics, a small simple machine, serving first to imbibe or suck in a quantity of water, or other fluid, and then to squirt or expel the same with violence in a small jet.

The syringe is in fact a small single sucking pump, without a valve, the water ascending in it on the same principle. It consists, like the pump, of a small cylinder, with an embolus or sucker, moving up and down in it by means of a handle, and fitting it very close within. At the lower end is either a small hole, or a smaller tube fixed to it than the body of the instrument, through which the fluid or the water is drawn up, and squirted out again.

Thus, the embolus being first pushed close down, introduce the lower end of the pipe into the fluid, then draw up, by the handle, the sucker, and the fluid will immediately follow, so as to fill the whole tube of the syringe, and will remain there, even when the pipe is taken out of the fluid; but by thrusting forward the embolus, it will drive the water before it; and, being partly impeded by the smallness of the hole, or pipe, it will hence be expelled in a smart jet or squirt, and to the greater distance, as the sucker is pushed down with the greater force, or the greater velocity.

This ascent of the water the ancients, who supposed a plenum, attributed to nature's abhorrence of a vacuum; but the moderns, more reasonably, as well as more intelligibly, attribute it to the pressure of the atmosphere on the exterior surface of the fluid. For, by drawing up the embolus, the cavity of the cylinder would become a vacuum, or the air left there extremely rarefied; so that being no longer a counterbalance to the air incumbent on the surface of the fluid, this prevails, and forces the water through the little tube, or hole, up into the body of the syringe.

To SY'RINGE. *v. a.* (from the noun.) 1. To spout by a syringe (*Wiseman*). 2. To wash with a syringe.

SYRINGO'TOMY. *s.* (συριγξ and τετομα.) The act or practice of cutting fistulas or hollow sores.

SYRPHUS, in the entomology of Fabricius, a tribe of the genus MUSCA, which see.

SYRTIS. *s.* (Latin.) A quicksand; a bog (*Milton*).

SYRUP. (*syrupus.*) When sugar is dissolved in any vegetable liquor, to the consistence of honey, a medicinal preparation is formed called syrup; which, if obtained from a single plant, is called *simple*; but if from more than one, *compound*. The following are the chief forms in our established pharmacopœias.

S. ACETI. A refrigerating and antiseptic syrup.

S. ALTHEÆ. An emollient and demulcent; mostly given to allay tickling coughs, hoarseness, &c. in conjunction with other remedies.

S. CARYOPHYLLI RUBRI. A warm and stimulating syrup.

S. COLCHICI. An acrid and diuretic compound given in dropsies.

S. CORTICIS AURANTII. A bitter and stomachic.

S. CROCI. This imparts a beautiful colour to liquids, and is sometimes employed as a cordial. Amongst the vulgar syrup of saffron is in high esteem in measles, small-pox, &c.

S. LIMONIS SUCCI. A very pleasant, cooling, and acid syrup which may be exhibited with advantage, in gastritis and bilious affections.

S. MORI. Syrup of mulberries, is very grateful and aperient, and may be given with such intentions to children.

S. PAPAVERIS ALBI. An useful anodyne preparation which may be added with advantage to a vast variety of medicines against diseases of the bowels, coughs, &c.

S. PAPAVERIS ERRATICI. A much milder preparation than the former.

S. RIBIS NIGRI. Aperient and diuretic qualities are attributed to this preparation.

S. ROSÆ. An useful laxative for children.

S. ROSARUM RUBRARUM. An adstringent and nutritive syrup mostly given to children with weak bowels who refuse the more nauseous drugs.

S. RUBI IDÆI. A pleasant aperient syrup for children.

S. SCILLITICUS. Expectorant and diuretic.

S. SPINÆ CERVINÆ. Syrup of buckthorn was formerly much used as a purgative, but now seldom except in glysters.

S. TOLUTANUS. An useful balsamic syrup, calculated to allay tickling coughs and hoarsenesses.

S. VIOLÆ. A pleasant laxative for young children.

S. ZINGIBERIS. A carminative.

SYSSARCOSIS. (συσσαρκωσις, from συν and σαρξ, flesh.) A species of union of bones in which one bone is united to another by means of an intervening muscle. In this manner the os hyoides is connected with the sternum and other parts.

SYSTEM, in general, denotes an assemblage or chain of principles and conclusions, or the whole of any doctrine, the several parts whereof are bound together, and follow or depend on each other; in which sense we say, a system of philosophy, a system of divinity, &c. The word is formed from the Greek συστημα, composition, compages.

SYSTEMS, in the animal economy, are the VASCULAR, the NERVOUS, and the CELLULAR; see those words.

SYSTEM, in astronomy, denotes an hypothesis or supposition of an arrangement of the several parts of the universe, whereby astronomers explain all the phenomena or appearances of the heavenly bodies, their motions, changes, &c. This is more properly called the systems of the world. System and hypothesis have much the same signification, unless perhaps hypothesis be a more particular system, and system a more general hypothesis. The three most celebrated systems of the world are the COPERNICAN, the PTOLEMAIC, and TYCHONIC. See those words: see also ASTRONOMY.

SYSTEM, in music, an interval compounded, or supposed to be compounded of several lesser intervals, as the fourth, the fifth, the sixth, the octave, &c. the components of which, considered as the elements of the system, are called diastems. A system is also a method of calculation to determine the relations of sounds, or an order of signs established to express them: and lastly, a system is the code of harmonic rules drawn from those common principles by which they are computed.

There is an infinity of different intervals, and consequently an infinity also of possible systems. Any interval between the terms of which one or more sounds intervened, was by the ancients called a system: E, G, for example, constituted the system of a minor third; E, A, of a fourth; E, B, of a fifth, &c.

Systems were divided into general and particular. The particular systems were those which were composed of at least two intervals. The general systems, or diagrams, were formed of the sum of all the particular systems, and consequently contained all the sounds in music.

The whole system of the Greeks was originally composed only of four sounds at most, which formed the concord of their lyre, or cithara. These four sounds, according to some authors, were by conjoint degrees; according to others, they were not diatonic; but the two extremes were at the distance of an octave, and the two intermediate ones divided it into a fourth on each side, and a tone in the middle. This system did not, however, continue long confined to so few sounds. Chorebus, son of Athis, king of Lydia, as Boetius informs us, added a fifth chord; Hyagnis a sixth; Serpander a seventh, to equal the number of the planets; and Lychaon, an eighth. But Pliny gives a different account of the progression of the ancient system; according to that writer, Terpander added three chords to the tetrachord, and was the first who used the cithara with seven chords; Simonides joined to it an eighth, and Timotheus a ninth.

Whichever of these accounts may be the true one, it seems pretty certain that the system of the Greeks was gradually extended, both upward and downward, and that it attained and even exceeded the limits of the bis-diapason, or double octave, an extent which they called *systema perfectum, maximum, immestatum*, the great system, the perfect system.

This entire system was composed of four tetrachords, three conjoint and one disjoint, and the chord called *proslambanomenos*, which was added below these tetrachords to complete the double octave.

This general system of the Greeks remained nearly in this state till the eleventh century, when Guido made a considerable change, by adding a new chord below, which he called *hypoproslambanomenos*; also a fifth tetrachord above, or tetrachord of the sur-sharp; and substituting hexachords in the place of the ancient tetrachords. Since the time of Guido, the general system has again been greatly extended, and divided into octaves, which has long been adopted throughout Europe, and which the ear certainly recognises as the most natural of all possible partitions of the great scale of sounds. See Music.

SYSTEMA'TICAL. *a.* (συςηματικος.) Methodical; written or formed with regular subordination of one part to another (*Bentley*).

SYSTEMA'TICALLY. *ad.* In form of a system (*Boyle*).

SYSTOLE. (συςολη, from συςελλω, to contract.) The contraction of the heart and arteries: opposed to diastole, which imports their relaxation.

Systole, in grammar, is the shortening of a long syllable.

SYSTYLE, in architecture, the manner of placing columns, where the space between the two fusts consists of two diameters, or four modules.

SYZYGY, a term equally used for the conjunction and opposition of a planet with the sun.

On the phenomena and circumstances of the syzygies, a great part of the lunar theory depends. See Astronomy. For,

1. It is shewn in the physical astronomy, that the force which diminishes the gravity of the moon in the syzygies, is double that which increases it in the quadratures; so that, in the syzygies, the gravity of the moon is diminished by a part which is to the whole gravity as 1 to 89.36; for, in the quadratures, the addition of gravity is to the whole gravity, as 1 to 178.73.

2. In the syzygies, the disturbing force is directly as the distance of the moon from the earth, and inversely as the cube of the distance of the earth from the sun. And at the syzygies, the gravity of the moon towards the earth receding from its centre, is more diminished than according to the inverse ratio of the square of the distance from that centre.—Hence, in the moon's motion from the syzygies to the quadratures, the gravity of the moon towards the earth is continually increased, and the moon is continually retarded in her motion; but in the moon's motion from the quadratures to the syzygies, her gravity is continually diminished, and the motion in her orbit is accelerated.

3. Farther, in the syzygies, the moon's orbit, or circuit round the earth, is more convex than in the quadratures; for which reason she is less distant from the earth at the former than the latter.—Also, when the moon is in the syzygies, her apses go backward, or are retrograde.—Moreover, when the moon is in the syzygies, the nodes move in antecedentia fastest; then slower and slower, till they become at rest when the moon is in the quadratures.—Lastly, when the nodes are come to the syzygies, the inclination of the plane of the orbit is the least of all.

These several irregularities, however, are not equal in each syzygy, being all somewhat greater in the conjunction than in the opposition.

T.

T, A consonant, and the nineteenth letter in the alphabet; the sound of which is formed by a strong expulsion of the breath through the mouth, upon a sudden drawing back of the tongue from the fore part of the palate, with the lips at the same time open.

The *T*, at the beginning and end of words, has always the same sound, nearly resembling that of D, for which reason they are often put for each other; and Quintilian even rallies those who made any scruple of writing the one indifferently for the other: as *at* for *ad*, *set* for *sed*, *haut* for *haud*, &c.

The customary sound of *T* is that which occurs in the words *take*, *temptation;* but before an *i*, when followed by a vowel, it has the sound of an obscure *s*, as *nation*, *salvation*, except when *s* precedes *t*, as *Christian;* and in derivatives from *y*, as *mighty*, *mightier*.

The *T* is one of the five consonants which the abbot de Dangeau calls *palatal:* these five are, *D*, *T*, *G*, *K*, and *N;* the four first whereof have the same relation to each other as the labials *B-P* and *V-F* have; *D*, for instance, having the same relation to *T* that *B* has to *P*, and *V* to *F*.

The *T*, the same author observes, is a letter of a strong sound; so that a feeble one cannot be heard before it. Hence, to form the supine of *rego*, the *T* of *tum* changes the *g*, and strengthens it to the sound of a *c*, so that we say *rectum*; as in the preterperfect tense *rexi*, which we pronounce *reksi*.

T *h* has two sounds; the one soft, as in *thus*; the other hard, as in *thing*. The sound is soft in these words, *then*, *thence*, *there*, with their derivatives and compounds, *that*, *these*, &c. and in all words between two vowels, as *father*; and between *r* and a vowel, as *burthen*. In other words it is hard, as *thick*, *thunder*. Where it is softened at the end of a word, an *e* silent must be added, as *breath*, *breathe*. Johnson.

T is used as an abbreviature on ancient monuments, &c. for Titus, Titius, and Tullius.

T, among the ancients, was used as a numeral letter, signifying 160, according to the verse

T quoque centenos et sexaginta tenebit.

When a dash was at the top, thus, $\overline{\mathrm{T}}$, it signified 160 thousand.

T′, with a kind of acute accent over it, denoted among the Greeks 300; and if the accent was below it, thus *T*͵, it denoted 300,000. The ט of the Hebrews signified 9, and with two points fixed horizontally over it, thus, ט̈, it signified 9000.

T, on the French coins, denotes those that were struck at Nantes.

When the Roman tribunes approved of the decrees of the senate, they testified their consent by subscribing a *T*.

T, in music, is sometimes used to mark the tenor part, or pitch.

T, in the Italian music, stands for *tutti*, all or altogether.

T, when used to mark the tenor, has the words *primo*, *secundo*, or the figures 1°. 2°. added, to signify the first or second tenor.

The letters *T*, *t*, or *tr*, are often used likewise to signify a shake or trillo, to be made on any sound, and are to be placed over the note on which the shake is to be.

T, or TAU, in heraldry, is a kind of cross-potent, or truncated; found in all the armories of the commanders of the order of St. Anthony.

The azure *T*, or TAU, is seen in arms above 400 years old. Its origin, according to some authors, is taken from the Apocalypse; where the same is a mark that the angel impresses on the foreheads of the elect: others take it to represent a crutch, a symbol proper enough for this order, which was sworn to hospitality. But the truth, F. Menestrier observes, is, that it is the top of a Greek crosier.

The bishops and abbots of the Greek church wear it still; and if it be found on the habit of St. Anthony, it is only to shew that he was an abbot.

T, in surgery, is the name of a bandage, so called on account of its figure.

TAAIF, a town of Arabia, in the province of Hedjas, with a considerable trade in fruits, raisins, and almonds. It is situate on a lofty mountain, 60 miles S.E. of Mecca. Lon. 41. 35 E. Lat. 21. 5 N.

TAAS, a strong city of Arabia, in the province of Yemen, with a fortress. Here is the tomb of a saint, who, according to tradition, was king of the country. It stands at the foot of a fertile hill, 48 miles E.N.E. of Mocha. Lon. 44. 10 E. Lat. 13. 45 S.

TAATA, a town of Upper Egypt, one mile from the Nile. It is the residence of a governor, has many curious remains of antiquity, and is 200 miles S. of Cairo. Lon. 31. 25 E. Lat. 26. 56 N.

TAAUT, or THOYT, in ancient mythology, the name of a deity among the Phœnicians, and probably the same with the Egyptian Thoyt, or Hermes: his cosmogony has been transmitted to us by the Phœnician writer Sanchoniatho, whose account is preserved by Eusebius, De Præp. Ev. lib. i. cap. 10. To him the Phœnicians ascribe the first invention of letters.

TABACUM. (from Tobago, the island whence it was first brought.) Tobacco. See Nicotiana.

TABAGA, an island in the bay of Panama, four miles long and three broad. It is mountainous, but abounds with fruit trees. Lon. 80. 16 W. Lat. 7. 50 S.

TABANUS. Flog. In zoology, a genus of the class insecta, order diptera. Mouth with a straight, exserted, membranaceous proboscis, terminated by three equal lips; sucker projecting, exserted, and placed in a groove on the back of the proboscis, with a single-valved sheath and five bristles; feelers two, equal, clavate, and ending in a point; antennas short, approximate, cylindrical, with an elevated tooth at the base. Fifty-two species, inhabiting Europe and America, a few Africa; six common to our own country.

These insects live by sucking out the blood of various animals, and especially of horses and black cattle, of which they are very greedy. The larves are found under ground in moist meadows: the colour of the eye vanishes when the insect is dead, but may be restored by placing it in warm water. The following are chiefly worthy of notice.

1. T. bovinus. Ox-fly. Eyes greenish; back of the abdomen with white, triangular, longitudinal spots. Inhabits Europe, and found in our own country: extremely troublesome to cattle, especially in the hottest part of the day during the summer season, piercing their skin with the lancet of its trunk, and sucking its blood in such a manner as to produce considerable pain.

2. T. pluvialis. Eyes green, with four waved bands; wings with brown dots. A small insect that fixes on the hands, face, and legs, exciting a painful inflammation in the part whence it has drawn blood.

3. T. cæcutiens. Eyes green, with black dots; wings with a black outer margin and band in the middle. Inhabits Europe and America, and indigenous to our own country: extremely troublesome in hot weather, especially before rain; like the last, fixing on the hands and face, or any uncovered part, dexterously opening a vein, and leaving an inflamed and bloody puncture behind.

TABARCA, an island on the coast of Barbary, at the mouth of the Zaine. It was fortified, and had a populous city of the same name, when under the dominion of the Genoese, who had a coral fishery here. But, in 1757, on the Genoese attempting to transfer the island to France, the Tabareans surrendered their city to Tunis; and they were cruelly deceived by the bey, for he razed the fortifications, and took away most of the inhabitants as slaves. It is 50 miles W.N.W. of Tunis. Lon. 9. 16 E. Lat. 36. 50 N.

TABARIA, the ancient Tiberias, a town of Palestine, situate on the W. side of a lake, formerly called the sea of Tiberias, 50 miles N.N.E. of Jerusalem, and 70 S.S.W. of Damascus. Lon. 35. 45 E. Lat. 32. 40 N.

TABASCO, a province of Mexico: bounded on the N. by the bay of Campeachy, E. by Jucatan, S. by Chiapa, and W. by Guaxaca. It is 100 miles long and 50 broad, and its chief riches consist in cocoa-nuts. There are showers every day for nine months in the year.

Tabasco, a town of Mexico, capital of the province of Tabasco. The Spaniards call it Nuestra Senora de la Vittoria, from a great victory obtained here by Cortes, on his first arrival. It is situate in an island of the same name, 30 miles long and 10 broad, formed by the river Tabasco and that of St. Peter and Paul, and on the bay of Campeachy, 270 miles N.E. of Chiapa. Lon. 93. 20 W. Lat. 18. 20 N.

TA'BBY. *s.* (*tabi*, *tabino*, Italian; *tabis*, French.) A kind of waved silk (*Swift*).

Ta'bby. *a.* Brinded; brindled; varied with different colours (*Addison*).

TABEFA'CTION. *s.* (*tabefacio*, Latin.) The act of wasting away.

To TA'BEFY. *v. n.* (*tabefacio*, Latin.) To waste; to extenuate (*Harvey*).

TABELLA, in medicine, a table, tablet, troch, or lozenge. See Troch.

TABERD, or Tabard, derived from the low Latin, *tabarda*, denotes a short jacket or coat, open on both sides, with a square collar and hanging-sleeves. From the wearing of this garment, some of those on the foundation of Queen's college, in Oxford, are called *taberdarii*, taberders.

From an inn in Southwark, whose sign was the tabard, afterwards changed to the talbot, Chaucer and his companion set out on a pilgrimage to the shrine of Becket at Canterbury, on which was founded his Canterbury Tales.

TABERNACLE, among the Hebrews, a kind of building, in the form of a tent, set up, by express command of God, for the performance of religious worship, sacrifices, &c. during the journeying of the Israelites in the wilderness; and, after their settlement in the land of Canaan, made use of for the said purpose till the building of the temple of Jerusalem. It was divided into two parts; the one covered, and properly called the tabernacle; and the other open, called the court. The curtains which covered the tabernacle were made of linen, of several colours, embroidered. There were ten curtains twenty-eight cubits long and four in breadth. Five curtains fastened together made up two coverings, which covered up all the tabernacle. Over these there were two other coverings; the one of goat's hair, the other of sheep's skins. The holy of holies was parted from the rest of the tabernacle by a curtain made fast to four pillars, standing ten cubits from the end. The length of the whole tabernacle was 32 cubits, that is, about 50 feet; and the breadth 12 cubits, or 19 feet. The court was a spot of ground 100 cubits long, and 50 in breadth, enclosed by 20 columns, each 20 cubits high and 10 in breadth, covered with silver, and standing on copper bases, five cubits distant from one another; between which there were curtains drawn, and fastened with hooks. At the east end was an entrance, 20 cubits wide, covered with a curtain hanging loose.

Tabernacles (Feast of), a solemn festival of the Hebrews, observed after harvest, on the 15th day of the month Tisri, instituted to commemorate the goodness of God, who protected the Israelites in the wilderness, and made them dwell in booths, when they came out of Egypt. On the first day of the feast, they began to erect booths of the boughs of trees, and in these they were obliged to continue seven days. The booths were placed in the open air, and were not to be covered with cloths, nor made too close by the thickness of the boughs; but so loose that the sun and the stars might be seen, and the rain descend through them. For further particulars of the celebration of this festival, see Levit. ch. xxiii.

To Ta'bernacle. *v. n.* (from the noun.) To enshrine; to house (*John*).

TABERNÆMONTANA, in botany, a genus of the class pentandria, order monogynia. Corol twisted; follicles two, horizontal; seeds immersed in pulp. Twelve species, natives of the East or West Indies, or of America. The following are cultivated:

1. T. citrifolia. Citron-leaved tabernæmontana.
2. T. laurifolia. Bay-leaved tabernæmontana.
3. T. Amsonia. Virginian tabernæmontana.
4. T. angustifolia. Narrow-leaved tabernæmontana.

The first and second are suffruticose; the third herbaceous, the fourth perennial in its root. They may be all increased by seeds; and the last two will bear the open air.

TABES. (from *tabeo*, to grow thin.) A wasting of the body. A genus of disease in the class cachexiæ, and order marceres of Cullen; characterised by emaciation and weakness, attended with hectic fever. It has three species: 1. Tabes purulenta, from an ulcerous discharge: 2. Tabes scrofulosa, from a scrofulous habit: 3. Tabes venenata, from poison.

TA'BID. *a.* (*tabidus*, Latin.) Wasted by disease; consumptive (*Arbuthnot*).

TA'BIDNESS. *s.* (from *tabid.*) Consumptiveness; state of being wasted by disease.

TA'BLATURE. *s.* (from *table.*) Painting on walls or cielings.

TA'BLE. *s.* (*table*, French; *tabula*, Latin.) 1. Any flat or level surface (*Sandys*). 2. A horizontal surface raised above the ground, used for meals and other purposes (*Locke*). 3. The persons sitting at table, or partaking of entertainment (*Shakspeare*). 4. The fare or entertainment itself: as, *he keeps a good* table. 5. A tablet; a surface on which any thing is written or engraved (*Bentley*). 6. (*tableau*, French.) A picture, or any thing that exhibits a view of any thing on a flat surface (*Addison*). 7. An index; a collection of heads; a catalogue; a syllabus (*Evelyn*). 8. A synopsis; many particulars brought into one view (*Ben Jonson*). 9. The palm of the hand (*Ben Jonson*). 10. Draughts; small pieces of wood shifted on squares (*Taylor*). 11. *To turn the* Tables. To change the condition or fortune of two contending parties (*Dryden*).

To Ta'ble. *v. n.* (from the noun.) To board; to live at the table of another (*Felton*).

To Ta'ble. *v. a.* To make into a catalogue; to set down (*Shakspeare*).

Table, a moveable piece of furniture, usually made of wood or stone, and supported on pillars or the like, for the commodious reception of things placed thereon. This term is also used for the fare or entertainment served up.

Table, in mathematics, systems of numbers calculated to be ready at hand for the expediting astronomical, geometrical, and other operations, as logarithmic tables, tables of sines, tangents, secants, &c. tables of the planet's places, the right ascensions and declinations of the fixed stars, tables of powers and products, roots, reciprocals, &c. most of which are well known to mathematicians, and are but of little interest to other persons.

Table Island, one of the New Hebrides, in the Pacific Ocean. Lon. 16. 77 E. Lat. 15. 38 S.

Table Mountain, a promontory of Africa, near the Cape of Good Hope. The bay at the foot of it is called Table Bay.

Tables (Laws of the twelve), were the first set of laws of the Romans; thus called either because the Romans then wrote with a style, on thin wooden tablets covered with wax; or rather, because they were engraved on tables or plates of copper, to be exposed in the most noted part of the public forum. After the expulsion of the kings, as the Romans were then without any fixed or certain system of law, at least had none ample enough to take in the various cases that might fall between particular persons, it was resolved to adopt the best and wisest laws of the Greeks. One Hermodorus was first appointed to translate them, and the decemviri afterwards compiled and reduced them into ten tables. After a world of care and application, they were at length enacted and confirmed by the senate and an assembly of the people, in the year of Rome 303. The following year they found something wanting therein, which they supplied from the laws of the former kings of Rome, and from certain customs which long use had authorised; all these being engraven on two other tables, made the law of the twelve tables, so famous in the Roman jurisprudence, the source and foundation of the civil or Roman law.

Tables of the law, in Jewish antiquity, two tables on which were written the decalogue, or ten commandments, given by God to Moses on mount Sinai.

TA'BLEBEER. *s.* (*table* and *beer.*) Beer used at victuals; small beer.

TA'BLEBOOK. *s.* (*table* and *book.*) A book on which any thing is graved or written without ink (*Shakspeare*).

TA'BLECLOTH. *s.* (*table* and *cloth.*) Linen spread on a table (*Camden*).

TA'BLEMAN. *s.* A man at draughts.

TA'BLER. *s.* (from *table.*) One who boards.

TA'BLETALK. *s.* (*table* and *talk.*) Conversation at meals or entertainments (*Atter.*).

TA'BLET. *s.* (from *table.*) 1. A small level surface. 2. A medicine in a square form (*Bacon*). 3. A surface written on or painted (*Dryden*).

TABOO, a word used by the South Sea islanders, nearly of the same import as prohibited or interdicted. It applies equally to persons and things, and is also expressive of any thing sacred, devoted, or eminent.

TABOR, a mountain of Palestine, mentioned in Scripture. This mountain is of the figure of a broken cone, eight hundred or a thousand yards in height. The summit is two-thirds of a league in circumference. Formerly it had a citadel, of which now only a few stones remain. From hence we discover to the south a series of valleys and mountains, which extend as far as Jerusalem; while, to the east, the valley of Jordan, and lake Tabaria, appear as if under our feet; the lake seems as if enclosed in the crater of a volcano.

Tabor, a town of Bohemia, in the circle of Bechin, on a mountain, which the Hussites, under their celebrated general Zisca, fortified and made their principal retreat. It is 25 miles N. by E. of Budweis, and 45 S. by E. of Prague. Lon. 14. 56 E. Lat. 49. 23 N.

Tabor, or Tabour. A small drum, usually forming an accompaniment to the pipe. They are both played by the same performer: while the tones of the pipe are regulated by the fingers of the left hand, which stop the holes, the tabor is beat by the right. The tabor and pipe have long been favourite instruments with the common people of most of the countries of Europe, and are particularly calculated for dancing parties.

To Ta'bour. *v. a.* (*taborer*, old French.) To strike lightly or frequently (*Nahum*).

TA'BOURER. *s.* (from *tabour.*) One who beats the tabour (*Shakspeare*).

TA'BOURET. *s.* (from *tabour.*) A small tabour (*Spectator*).

TA'BOURINE. *s.* (French.) A tabour; a small drum (*Shakspeare*).

TABRET. See Tabor.

TA'BULAR. *a.* (*tabularis*, Latin.) 1. Set down in the form of tables or synopses. 2. Formed in laminæ (*Woodward*). 3. Set in squares.

To TA'BULATE. *v. a.* (*tabula*, Latin.) 1. To reduce to tables or synopses. 2. To shape with a flat surface.

TA'BULATED. *a.* (*tabula*, Latin.) Having a flat surface (*Grew*).

TACAMAHACCA (Indian). The name of a resinous substance which exudes both spontaneously and when incisions are made into the stem of the calophyllum irophyllum of Linnéus, and not, as was formerly supposed, from the populus balsamifera, or the fagaria octandria of Linnéus. Two kinds of tacamahacca are met with in the shops. The best, called, from its being collected in a kind of gourd shell, tacamahacca in shells, is somewhat unctuous and soft, of a pale yellowish or greenish colour, a bitterish aromatic taste, and a fragrant delightful smell, approaching to that of lavender and ambergris. The more common sort is in semi-transparent grains, of a whitish, yellowish, brownish, or greenish colour, and of a less grateful smell than the former. Tacamahacca was formerly in high estimation as an ingredient in warm stimulating plasters; and although seldom used internally, it may be given with advantage as a corroborant and adstringent balsamic.

TACET. (Latin.) A word by which the musical performer is to understand that the instrument with the name of which it is conjoined is to be silent: as *violino tacet*; the violin is not to play: *obœ tacet*; the oboe is silent.

TACFARINAS, a Numidian who commanded an army against the Romans in the reign of Tiberius. He had formerly served in the Roman legions. After he had severally defeated the officers of Tiberius, he was at last routed and killed in the field of battle, fighting with uncommon fury, by Dolabella.

TACHAU, or Tachow, a town of Bohemia, in the circle of Pilsen, 28 miles W. of Pilsen. Lon. 13. 27 E. Lat. 49. 46 N.

TACHE. *s.* (from *tack.*) Any thing taken hold of; a catch; a loop; a button (*Exodus*).

TACHOMETER, an instrument to ascertain the velocities of machinery.

In the employment of machinery it is evidently of great importance to be provided with an easy and ready method for discovering at all times, whether the motion of the machine is quicker or slower than what is known to be best adapted for the object in view. This advantage, it is thought, may be derived from Mr. Donkin's tachometer; for it is an instrument which requires only to be adjusted once for all to any particular machine, and then it will always be ready without the help of calculation or of a time-piece, to indicate instantly upon inspection the slightest excess or defect in the actual velocity.

A front view of the tachometer is represented in fig. 1, and a side view in fig. 2, of pl. 167. X Y Z, fig. 1, is the vertical section of a wooden cup, made of box, which is drawn in elevation at X, fig. 2. The whiter parts of the section, in fig. 1, represent what is solid, and the dark parts what is hollow. This cup is filled with mercury up to the level L L, fig. 1. Into the mercury is immersed the lower part of the upright glass tube A B, which is filled with coloured spirits of wine, and open at both ends, so that some of the mercury in the cup enters at the lower orifice, and when every thing is at rest, supports a long column of spirits, as represented in the figure. The bottom of the cup is fastened by a screw to a short vertical spindle D, so that when the spindle is whirled round, the cup (the figure of which is a solid of revolution) revolves at the same time round its axis, which coincides with that of the spindle.

In consequence of this rotation the mercury in the cup acquires a centrifugal force, by which its particles are thrown outwards, and that with the greater intensity, according as they are more distant from the axis, and according as the angular velocity is greater. Hence, on account of its fluidity, the mercury rises higher and higher as it recedes from the axis, and consequently sinks in the middle of the cup; this elevation at the sides, and consequent depression in the middle, increasing always with the velocity of rotation. Now the mercury in the tube, though it does not revolve with the cup, cannot continue higher than the mercury immediately surrounding it, nor indeed so high, on account of the superincumbent column of spirits. Thus the mercury in the tube will sink, and consequently the spirits also; but as that part of the tube which is within the cup is much wider than the part above it, the depression of the spirits will be much greater than that of the mercury, being in the same proportion in which the square of the large diameter exceeds the square of the smaller.

Let us now suppose, that, by means of a cord passing round a small pulley F, and the wheel G, or H, or in any other convenient way, the spindle D is connected with the machine, the velocity of which is to be ascertained. In forming this connection, we must be careful to arrange matters so, that when the machine is moving at its quickest rate, the angular velocity of the cup shall not be so great as to depress the spirits below C into the wider part of the tube. We are also, as in the figure, to have a scale of inches and tenths applied to A C, the upper and narrower part of the tube, the numeration being carried downward from zero, which is to be placed at the point to which the column of spirits rises when the cup is at rest.

Then the instrument will be adjusted, if we mark on the scale the point to which the column of spirits is depressed, when the machine is moving with the velocity required. But, as in many cases, and particularly in steam-engines, there is a continued oscillation of velocity, in these cases we have to note the two points between which the column oscillates during the most advantageous movement of the machine.

Here it is proper to observe, that the height of the column of spirits will vary with the temperature, when other circumstances are the same. On this account the scale ought to be moveable; so that, by slipping it upwards or downwards, the zero may be placed at the point to which the column reaches when the cup is at rest; and thus the instrument may be adjusted to the particular temperature with the utmost facility, and with sufficient precision. The essential parts of the tachometer have now been mentioned, as well as the method of adjustment; but certain circumstances remain to be stated.

The form of the cup is adapted to render a smaller quantity of mercury sufficient than what must have been employed either with a cylindrical or hemispherical vessel. In every case two precautions are necessary to be observed: First, that when the cup is revolving with its greatest velocity, the mercury in the middle shall not sink so low as to allow any of the spirits in the tube to escape from the lower orifice; and that the mercury, when most distant from the axis, shall not be thrown out of the cup. Secondly, that when the cup is at rest, the mercury shall rise so high above the lower end of the tube, that it may support a column of spirits of the proper length.

Now in order that the quantity of mercury, consistent with these conditions, may be reduced to its minimum, it is necessary, first, that if M M, fig. 1, is the level of the mercury at the axis when the cup is revolving with the greatest velocity, the upper part, M M X Y, of the cup should be of such a form, as to have the sides covered only with a thin film of the fluid; and secondly, that for the purpose of raising the small quantity of mercury to the level L L, which may support a proper height of spirits when the cup is at rest, the cavity of the cup should be in a great measure occupied by the block K K, having a cylindrical perforation in the middle of it for the immersion of the tube, and leaving sufficient room within and around it for the mercury to move freely both along the sides of the tube and of the vessel.

The block K K is preserved in its proper position in the cup or vessel X Y Z, by means of three narrow projecting slips or ribs placed at equal distances round it, and is kept from rising or floating upon the mercury by two or three small iron or steel pins inserted into the underside of the cover, near the aperture through which the tube passes.

It would be extremely difficult, however, nor is it by any means important, to give to the cup the exact form which would reduce the quantity of mercury to its minimum; but we shall have a sufficient approximation, which may be executed with great precision, if the part of the cup above M M is made a parabolic conoid, the vertex of the generating parabola being at that point of the axis to which the mercury sinks at its lowest depression, and the dimensions of the parabola being determined in the following manner: Let V G, fig. 3, represent the axis of the cup, and V the point to which the mercury sinks at its lowest depression; at any point G above V, draw G H perpendicular to V G; let n be the number of revolutions which the cup is to perform in $1''$ at its quickest motion; let v be the number of inches which a body would describe uniformly in $1''$, with the velocity acquired in falling

TACHOMETER.

PL. 167.

Fig. 1.

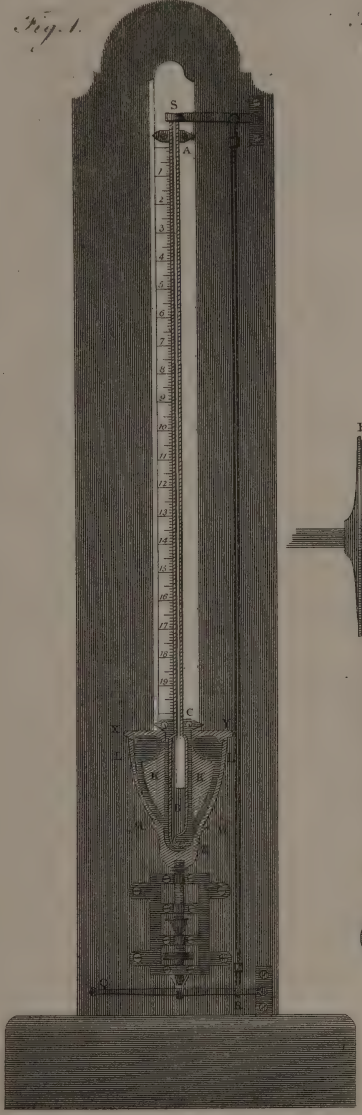


Fig. 2.

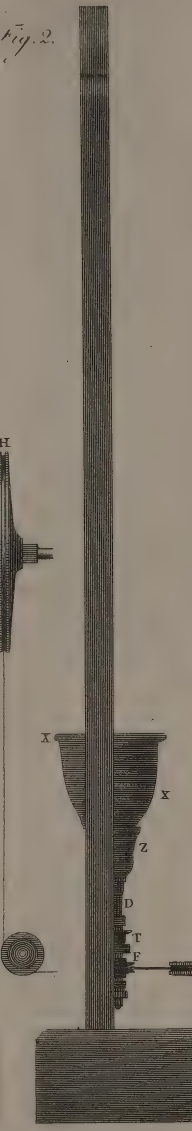


Fig. 4.

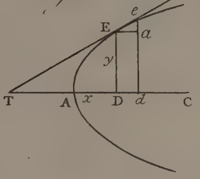
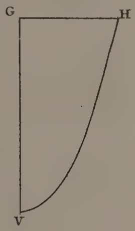


Fig. 3.



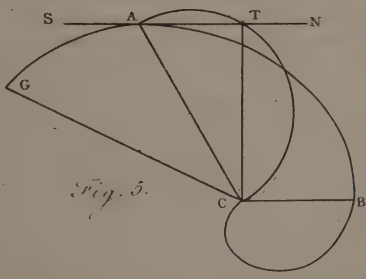


Fig. 5.

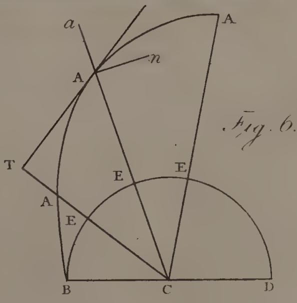


Fig. 6.

Mutlow sc Russell Ct.

London, Published by Sherwood & Co. Paternoster Row. Feby. 1. 1813.

from rest, through a height = to G V; and make $G H = \frac{v}{3^{\circ}\cdot 14\, n}$. Then, the parabola to be determined is that which has v for its vertex, V G for its axis, and G H for its ordinate at G. The cup has a lid to prevent the mercury from being thrown out of it, an event which would take place with a very moderate velocity of rotation, unless the sides were raised to an inconvenient height; but the lid, by obstructing the elevation at the sides of the cup, will diminish the depression in the middle, and consequently the depression of spirits in the tube: on this account a cavity is formed in the block immediately above the level L L, where the mercury stands when the cup is at rest; and thus a receptacle is given to the fluid which would otherwise disturb the centrifugal force, and impair the sensibility of the instrument.

It will be observed, that the lower orifice of the tube is turned upwards. By this means, after the tube has been filled with spirits by suction, and its upper orifice stopped with the finger, it may easily be conveyed to the cup and immersed in the quicksilver without any danger of the spirits escaping, a circumstance which otherwise it would be extremely difficult to prevent, since no part of the tube can be made capillary, consistently with that free passage to the fluids, which is essentially necessary to the operation of the instrument.

We have next to attend to the method of putting the tachometer in motion, whenever we wish to examine the velocity of the machine. The pulley F, which is continually whirling during the motion of the machine, has no connection whatever with the cup, so long as the lever Q R is left to itself. But when this lever is raised, the hollow cone T, which is attached to the pulley and whirls along with it, is also raised, and embracing a solid cone on the spindle of the cup, communicates the rotation by friction. When our observation is made, we have only to allow the lever to drop by its own weight, and the two cones will be disengaged, and the cup remain at rest.

The lever Q R is connected by a vertical rod to another lever S, having at the extremity S a valve, which, when the lever Q R is raised, and the tachometer is in motion, is lifted up from the top of the tube, so as to admit the external air upon the depression of the spirits; on the other hand, when the lever Q R falls, and the cup is at rest, the valve at S closes the tube, and prevents the spirits from being wasted by evaporation.

It is lastly to be remarked, that both the sensibility and the range of the instrument may be infinitely increased; for, on the one hand, by enlarging the proportion between the diameters of the wide and narrow parts of the tube, we enlarge in a much higher proportion the extent of scale corresponding to any given variation of velocity: and on the other hand, by deepening the cup so as to admit, when it is at rest, a greater height of mercury above the lower end of the tube, we lengthen the column of spirits which the mercury can support, and consequently enlarge the velocity, which, with any given sensibility of the instrument, is requisite to depress the spirits to the bottom of the scale. Hence the tachometer is capable of being employed in very delicate philosophical experiments, more especially as a scale might be applied to it, indicating equal increments of velocity. But in the present account it is merely intended to state how it may be adapted to detect in machinery every deviation from the most advantageous movement. Trans. Soc. Arts, vol. 28.

TACHOS, or TACHUS, a king of Egypt, in the reign of Artaxerxes Ochus, against whom he sustained a long war. He was assisted by the Greeks, but his confidence in Agesilaus, king of Lacedæmon, proved fatal to him; for, disregarding his engagement, and joining with Nectanebus, who had revolted from Tachus, he ruined the affairs of the monarch, and obliged him to save his life by flight.

TACHY'GRAPHY. *s.* (ταχυς and γραφω.) The art or practice of quick writing.

TA'CIT. *a.* (*tacite*, French; *tacitus*, Lat.) Silent; implied; not expressed by words.

TA'CITLY. *ad.* (from *tacit.*) Silently; without oral expression (*Rogers*).

TACITU'RNITY. *s.* (*taciturnité*, French; *taciturnitas*, Lat.) Habitual silence (*Arbuth.*).

TACITUS (Caius Cornelius), a Roman historian, of whose ancestors nothing is known, so that it is probable the dignity of his family began in his own person; at least, that it was not very considerable before him. His first employ is said to have been that of procurator to Vespasian in Gallia Belgica. Upon his return to Rome, Titus advanced him to a more honourable post; it is not mentioned what; but it is supposed to be the quæstorship, or ædileship, as Domitian advanced him to the prætorship. Lastly, he was made consul under Nerva: he was substituted in the place of the excellent Virginius Rufus, who died in his third consulship; and he honoured Rufus with a funeral oration. We know but few circumstances of the life of Tacitus besides what have been related, only that he married the daughter of Julius Agricola, famous for his exploits in Britain, whose life he has written. Some have pretended that Domitian banished him; but there is no foundation for this fact in history, and Mr. Bayle explodes it as an idle fancy. Lipsius has conjectured, and Mr. Bayle approves the conjecture, that Tacitus was born either in the last year of the reign of Claudius, or in the first of that of Nero; and supposes him to have died in the reign of Hadrian. The time of his death is not known; but all agree that he lived to be old. The remains of Tacitus shew that the ancients prized him very highly. He was the greatest orator and statesman of his time; he had long frequented the bar with infinite applause; he had passed through all the high offices of state; he was ædile, prætor, consul; but all these gave him little glory, compared with that which he acquired by the performances of his pen. His History, which extended from the reign of Galba inclusively, to the reign of Nerva exclusively, was highly esteemed; and his Annals equally so. Besides these, there remain of Tacitus a Treatise of the Situation, Customs, and People of Germany, and a Life of Julius Agricola; for as to the dialogue De oratoribus, sive de causis corruptæ eloquentiæ, though commonly printed with Tacitus's works, and by some ascribed to him, it is generally, and with reason, supposed to have been written by some other person.

On the whole, however, the writings of Tacitus have been too highly classed. Mr. Hunter, in his observations on this historian, says, "Having considered the principal qualities of Tacitus as a writer and an historian, I cannot help thinking that there is a false sublime and affectation in his description; a scurrility and satirical vein, with too epigrammatical a conciseness in his wit; an acuteness, but too speculative, and a policy over refined in his observations; a malignant and ill-natured turn in his characters; a philosophy too abstracted and elevated in his reasoning, and a vanity in his learning. In short, that he is in antiquity a pedant; in the philosophy of nature a sceptic; in morals loose; in description gaudy and pompous; in politics subdolous, refined, and knavish."

Tacitus has been translated into English by Gordon and Murphy. The editio princeps of Tacitus, in folio, containing only the six last books of the Annals, and the five first of the Histories, is a work of extraordinary rarity, supposed, by bibliographers, to have been printed in 1468. The first edition of all the works of Tacitus was by Beroaldus, andpublished at Rome, in folio, 1515. There are numerous other editions, of which those of Gronovius, 4to. 1721; Mrs. Grierson, 8vo. 1730; Ernesti, 8vo. 1752—72; Brotier, 4to. 1771; 12mo. 1776; Homer, 8vo. 1790; the Edinburgh editions in 4to. and 8vo. 1796; and of Oberlin, 8vo. 1801; are much and deservedly esteemed.

TACITUS (M. Claudius), a Roman elected emperor by the senate, after the death of Aurelian. The time of his administration was very popular; the good of the people was his care. He abolished the brothels in Rome, and ordered all the public baths to be shut at sunset. The senators under Tacitus seemed to have recovered their ancient dignity, and long-lost privileges. During a short reign of about six months, he not only repelled the barbarians who had invaded the territories of Rome in Asia, but he prepared to make war against the Persians and Scythians. He died in Cilicia as he was on his expedition, of a violent distemper, or, according to some, he was destroyed by the secret dagger of an assassin, on the 13th of April, in the 276th year of the Christian era. It has been observed, that he never passed a day without consecrating some part of his time to reading or writing.

To TACK. *v. a.* (*tacher*, Breton.) 1. To fasten to any thing (*Grew*). 2. To join; to unite; to stitch together (*Shakspeare*).

To TACK. *v. n.* (probably from *tackle.*) To turn a ship. See SEAMANSHIP.

TACK. *s.* (from the verb.) 1. A small nail. 2. The act of turning ships at sea (*Dryden*). 3. *To hold* TACK. To last; to hold out (*Hudibras*).

TA'CKLE. *s.* (*tacel*, Welsh.) 1. An arrow (*Chaucer*). 2. Weapons; instruments of action (*Butler*). 3. The ropes of a ship (*Addison*).

TA'CKLED. *a.* (from *tackle.*) Made of ropes tacked together (*Shakspeare*).

TA'CKLING. *s.* (from *tackle.*) 1. Furniture of the mast (*Bacon*). 2. Instruments of action (*Walton*).

TACQUET (Andrew), a Jesuit of Antwerp, who died in 1660. He was a most laborious and voluminous writer in mathematics. His works were collected, and printed at Antwerp in one large volume in folio, 1669.

TACTICS, in their general acceptation, relate to those evolutions, manœuvres, and positions, which constitute the main spring of military and naval finesse: they are the means whereby discipline is made to support the operations of a campaign, and are, in every regular service, studied for the purpose of training all the component parts according to one regular plan or system; whereby celerity, precision, and strength, are combined, and the whole rendered completely efficient. Of military tactics, the Romans may be considered the first nation whose military array could be termed regular, and whose forces maintained that order, which rendered each inferior individual subject to the control of certain subaltern officers commanding small bodies, corresponding with our sections; which being again compacted under officers of a second class, formed small divisions, as in our platoons, or companies; and which divisions being collected under a third class of officers, constituted what we term battalions. The soldiers of ancient Italy were not only inured to great hardships, as a part of their usual exercise, but were taught many evolutions suited to the modes of warfare in those days.

Time has occasioned a considerable change in that particular; for since the invention of gunpowder, our battles have frequently been decided by distant cannonades; and by no means resemble those arduous conflicts in which the heroes of old used to engage, individually contending for the day and causing the whole field to resemble an infinity of single combats. In this practice all barbarous nations seem uniformly to agree; the sword, the tomahawk, the club, &c. being the chief instruments; though in some instances the javeline, or spear, or the bow and arrow, may be primarily resorted to. Hence such warfare is far more sanguinary than that carried on with fire-arms; which rarely do much execution, unless when aided by artillery, and then only when at such distances as to be within reach of case-shot. It will no doubt surprise most of our readers, but is strictly true, that, taking the average quantity of musket ammunition expended, as a sum to be divided by the number of killed and wounded, not more than one shot in fifty will be found to take effect. Thus, after a battalion of 1000 men may have fired 20 rounds per man, making in all 20,000 discharges of musketry, they will have made terrible havoc if 400 of the enemy be disabled.

Hence we find, that the great features in decisive actions are few indeed; and they depend chiefly on tactics. Thus where a large force is brought to bear upon any particular point, while the enemy is kept in ignorance as to the object in view; or where certain advantages of locality are gained, merely by dint of superior science in the art of conducting troops by the shortest means, and in the greatest order; or where by certain evolutions a small force is made to supply the purpose of a larger, or to resist, independently of intrenchments, &c. a more numerous body; all these evince the presence of the man of tactics, and qualify him for the designation of an able general.

We have also another branch, which is in a degree secondary, because it depends greatly on the success of the former; namely, the arrangement, or disposition, of a line, in such manner as may allow each description of force to act with effect; this can be done only when the nature of the service to be performed is suited to the nature of the troops by which it is to be attempted. In this we necessarily mean to restrict the operations of infantry to storming parties, cavalry to champaign operations, and artillery to situations where it can be duly protected, while rendering essential service. Hence the able tactician always arranges his force in such manner, as to allow each to perform its duty without interfering with the evolutions of any other class; and in, what is called, manœuvring his army, never fails to estimate the distances, and the time in which each may execute the assigned duty; so that the whole may coincide with one great intention, and insure success by the accurate execution of its respective functions: were it to be otherwise, the whole must be subject to disorder; one failure often leading to the most serious consequence; the same as is caused by the want of a cog, or tooth, of any wheel in a piece of machinery. From this it may be seen how great a superiority that commander must possess who, by means of this science, fully comprehends the most ready arrangement of troops, where change of position becomes necessary; and who has, in the first instance, so disposed them as to be able to make those changes (even under the disadvantages ever attendant upon such necessity) with celerity, and in good order.

Tactics (Naval), relate to those operations in the management of a vessel, which enable her to attain any particular object, such as reaching a port, avoiding danger, gaining an advantage over an enemy, &c. In a more extended sense, they denote those manœuvres, stratagems, and deceptions, employed by the commander of a fleet, for the purpose of gaining a weather-gage, cutting off any part of a line, or attacking any particular portion thereof, in such manner as may either defeat the views of a hostile fleet, or subject it to loss and discomfiture. The old system of tactics in this, as well as in the military branch, was burthened with ceremonies, and with received opinions, which were held to be inviolable: the difference of one or two ships in favour of the enemy, was considered a sufficient excuse for a variety of precautions generally amounting to forbearance from engaging the superior power; and, although we certainly can count a number of gallant exploits performed by our fleets when somewhat inferior to the enemy, it has been reserved for latter times to exhibit what could be done by the British navy, even when opposed to nearly double their own force. This wonderful change was introduced by Rodney; who, in the year 1782, engaged the French fleet under count de Grasse; when by boldly cutting off a part of its rear, he compelled nearly half the enemy's force to surrender; the rest sought their safety in flight. Since that date admiral Jervis, by a skilful manœuvre, cut off a large portion of a Spanish fleet, near Cape St. Vincent's, (whence the peerage bestowed on him received its designation); but the late lord Nelson appears most conspicuous in that mode of attack which, in general, secured a victory. The battle of the Nile was doubtless a master-piece of tactical science; it merits notice from its simplicity, and, if we may be so bold as to use the term, its infallibility. The manœuvre he used was, to throw two of his ships upon every one of the weather-most of the enemy's line, by causing his fleet to divide as it approached them; consequently including each French ship between two of ours. The residue, which were moored in a line a-head, fully expected to see ours range up their whole length, and oppose ship to ship. They saw their error when it was too late; being to leeward, it was impossible for them to render efficient aid, and they fell in detail; with the exception of a very small portion, which escaped by putting out to sea, whither we were not in a condition to follow with any hopes of overtaking them.

In the famous battle of Trafalgar, in which the immortal Nelson quitted his earthly frame, the combined fleets were drawn up in the form of a crescent, and awaited our attack, which was made in a double column, apparently bearing down upon their centre. This novel mode of coming into action kept the enemy completely in suspense; it threatened every part of their line. If our two columns had turned the same way, they would have been able to do infinite damage in that quarter, before the other wing of the enemy could come up to succour their overpowered friends: if the two columns should cut through the centre, they must destroy it, and effectually separate the two wings, so as to leave them ignorant of each other's fate. Such was the fact: the enemy, though superior in numbers, lost no less than nineteen sail of the line.

Perhaps nothing can place a fleet in a more dangerous state, and render it less able to resist an attack, than making sail before the wind, in a line of battle a-head, to avoid a pursuing enemy. In such a case, whenever the rear of that line can be brought to action, it becomes subject to an accumulating force, in consequence of the pursuing fleet thickening upon it; while the van of its own line, being to leeward, must make many tacks, or at least two long ones, before it can succour its rear. The disadvantage must be very great even if all the ships, on both sides, sail upon an exact equality; but, as that is never the case, many of the flying ships will be probably driven completely to leeward, and never be able to afford the smallest assistance. Yet British seamen, even when compelled to retire before a very superior force, generally manage, by some well-contrived device, to intimidate their pursuers, or to put on so good a face, as to convince them of the dear price at which the victory is to be bought. Of this we cannot quote a more appropriate instance than the escape of five sail of our ships, under the command of admiral Cornwallis, from no less than nineteen sail of French ships of the line: an escape resulting entirely from the manœuvres of the British admiral; whereby he fully convinced the French that a large force was at hand.

The present unparalleled state of discipline, throughout our navy, would, of itself, give us the command of the ocean; but we are greatly indebted, at the same time, to an excellent code of signals, both for the day and the night, whereby every operation and manœuvre may be directed with readiness and perspicuity. The day signals are, for the most part, made by flags, jacks, and pennants; the night signals by lanterns, blue lights, maroons, &c. in both, the firing of guns, either to windward or to leeward, occasionally is added. When fleets are large, or their duty extensive, especially in cruizing to intercept a convoy of merchant vessels, &c. there are repeating frigates, which display the several signals made by the commander; so that they may be communicated to all the vessels; every signal being kept flying until answered by all ships to which they may relate.

When orders are given to clear ship for action, the boatswain and his mates whistle, and call, at the various hatchways, to warn all who are between decks; the hammocks, or beds, are instantly unhooked, packed, and sent on deck, to be put into the nettings on the waist, forecastle, quarters, poop, &c. where they serve as an excellent defence against musketry. While some of the seamen are thus employed between decks, others are aloft securing the yards in chain slings, so as to prevent them from falling when the haul-yards may be severed by cannon shot; materials for repairing the rigging are also placed in readiness; shot-plugs, for stopping holes near, or under, the surface of the water, are dispensed; and every attention is paid to ascertain that the pumps are in order, so as to clear the hold in case of leaks. The decks are cleared of every incumbrance, by the removal of chests, &c. into the hold; the various gun-tackles are inspected; and all the necessary implements, such as powder-ladles, worms, rammers, sponges, &c. are duly supplied. All being ready, the surgeon and his mate, together with the chest of medicines, instruments, bandages, &c. are prepared in the cock-pit; that is, down the hatchway, below the ordinary reach of the enemy's shot. The officers and men repair to their posts, the powder-room is opened, the hatches are all laid, the marines drawn up on the forecastle, quarter-deck, and poop, the guns are run out and levelled, and the courses, (that is, the lower sails) are clued up, to prevent their being set on fire by the discharges from the cannon; also to render the ship more manageable.

The greatest attention is always paid to taking a good aim before a gun is fired; that every shot may hit some part of the enemy's hull; the nearer to the water's edge the better. The captain, master, purser, &c. remain on deck to fight the ship, and to note down all occurrences, while the signal-master attends to and answers whatever signals may be thrown out by the commander of the fleet, or division. It is ever a primary object to place the ship in such a position as may annoy the enemy most; yet, at the same moment, evade his principal defences: this is best done by laying diagonally upon her quarter, or bow, and especially across her stern, so as to rake her fore and aft; whereby her guns will soon be dismounted, and the men driven from their quarters.

This description of the manner in which the battle is carried on by each ship will serve as an illustration of the whole; but it may be necessary to add, that the disposition of a fleet must be suited to the position the adversary may have assumed. When an enemy opposes a direct line, opposite to that of his own fleet, the admiral rarely does more than make the signal for line of battle abreast, perhaps a cable's length asunder, thus coming at once to close engagement, ship opposed to ship, or rather the two fleets intermixed alternately, their heads laying different ways: if they should pass each other, it is usual to put about, and resume the engagement in the same manner. When the enemy bear down in a line a-head, it is customary to receive them in the same manner, to prevent their cutting off a part of the line; this depends greatly on the direction of the wind; but if it be on the beam, that is full on the side, or in any direction affording the means of aiding your van, without delay, by a press of sail, such a mode of attack will subject the enemy to have his own line cut, as was done by Rodney; or doubled upon, as in the battle of the Nile.

During an engagement, the courses are commonly hauled up, as before stated; the top-gallant-sails and stay-sails are also furled. The movement of each ship is chiefly regulated by the main and fore-top sails, and the jib, re-serving the mizen to fill, or to be thrown aback, as an aid, either to accelerate the ship, or as a check to prevent her passing the enemy. The frigates, tenders, and other small vessels generally lay to, or hover about in the rear, to repeat signals, or to aid crippled ships. These, not being considered as ships of the line, are not attacked, except by vessels of their own class; therefore, when a fleet is not well manned, it is common to take all the spare hands from such to assist on board the fighting ships. When a fleet is superior in numbers, it is proper to keep some of them in reserve, stationing them behind the weaker parts of the line to succour such as may, by the loss of masts, &c. become unmanageable, and to take advantage of any opportunity to chase, and lay aboard of whatever of the enemy's ships may quit the line for the purpose of escaping. In order to observe what is going on, the admiral generally removes to some frigate, on board which he hoists his flag; near him should be some of the best sailing cutters, brigs, &c. to convey orders which could not be accurately delivered by signal, or by telegraph.

Boarding is most commonly resorted to by privateers, in their attacks upon merchant vessels; but among ships of the line is rarely practised. Our commanders are perhaps more forward than those of any other nation, except the Turks, in this kind of enterprise, which is replete with hazard. The best mode of boarding, especially if there be any swell, is to keep on the enemy's weather quarter; now and then, if the sailing of your ship will allow, yawing, so as to throw your fire into her stern: when, by this means, you have done any execution, it will be proper to pass close under the enemy's stern, raking her fore and aft with your guns double shotted, and then lay her aboard upon her lee beam, having your tops well manned to fire upon the enemy's decks, on which also grenades, stink-pots, fire-balls, &c. should be discharged. Having grappled the ship to your adversary's chains, your boarders jump into her, under the cover of the fire of your small arms. In case of repulse, the attack to leeward is most favourable to the retreat of your men; besides, it is far easier to cast off from the enemy, than it would be if you were to windward of her (*Brit. Ency.*).

The writers on naval tactics have been but few, indeed, considering the importance of the subject; and the only countries that have produced writers on this subject, so far as we know, are France and Britain, particularly the first. One would be led to imagine that Britain, from its insular situation, having bred so great a number of excellent seamen, and having so often been engaged in naval contests, would naturally have produced a number of writers on this, as well as on subjects of much less consequence to it as a nation. The reader will, however, no doubt be surprised to hear, that till lately we had only one treatise on naval tactics, entitled An Essay on Naval Tactics, &c. by John Clerk, esq. of Elden, near Edinburgh; most of the other treatises published in Britain on this subject being either translations from the French, or remarks upon the French authors. Some of the principal French treatises on naval tactics are the following: 1. L'Art des Armées Navales, ou Traité des Evolutions Navales, par Paul L'Hoste, one vol. folio, printed at Lyons, 1727. This book was translated and published by Christopher O'Bryen, esq. in 4to. in 1762. 2. Tactique Navale, ou Traité des Evolutions et des Signaux, par M. le Viscompte de Morogues, 4to. Paris, 1763. 3. Le Manœuvrier, par M. Bourdé de Villehuet. 4. L'Art de Guerre en Mer, ou Tactique Navale, &c. par M. le Viscompte de Grenier. Translations of the two last have appeared in English in 4to. in 1788, under the name of the Chevalier de Sauseuil; and a translation of parts of the three last is in the second volume of the Elements and Practice of Rigging and Seamanship, published at London in 1794. Other books on evolutions and tactics are Théorie de la Manœuvre des Vaisseaux, Paris, 1689. Pitot's Theory of working Ships applied to Practice, &c. translated by Stone, 1743. De la Manœuvre des Vaisseaux, ou Traité de Mechanique et de Dynamique, &c. par M. Bouguer. The British Mars, &c. by William Flexney, 1763. A Sea Manual, by Sir Alexander Schomberg, 1789. A View of the Naval Force of Great Britain, &c. by an Officer of Rank, 1791; and the ingenious treatise on Naval Tactics by captain Hamstead.

TA'CTILE. *a.* (*tactile*, Fr. *tactilis*, *tactum*, Lat.) Susceptible of touch (*Hale*).

TACTI'LITY. *s.* (from *tactile*.) Perceptibility by the touch.

TA'CTION. *s.* (*taction*, Fr. *tactio*, Latin.) The act of touching.

TADCASTER, a town in the W. riding of Yorkshire, with a market on Thursday. Great plenty of limestone is dug up near it; and there is a large stone bridge over the river Wharf. It is nine miles S.W. of York, and 188 N. by W. of London. Lon. 1. 12 W. Lat. 53. 52 N.

TADIVAN, or TADUAN, a town of Farsistan, 60 miles S. of Schiras. Lon. 54. 15 E. Lat. 28. 45 N.

TADMOR. See PALMYRA.

TADOUSAC, a town of Lower Canada, which is a place of great resort for trading with the Indians, who bring thither furs to exchange for cloth and other European goods. It is situate at the mouth of the Saguenay, 98 miles N.E. of Quebec. Lon. 69. 35 W. Lat. 48. 5 N.

TA'DPOLE. *s.* (ꞇaꝺ, toad, and *pola*, a young one, Sax.) A young shapeless frog or toad, in its earliest and imperfect state. See RANA.

TA'EN. The poetical contraction of *taken*.

TÆNARUS, a promontory of Laconia, where Neptune had a temple. In it was a large and deep cavern, whence issued a black and unwholesome vapour, and hence it was fabled by the poets to be one of the entrances of hell. This fabulous tradition arises, according to Pausanias, from the continual resort of a large serpent near the cavern of Tænarus, whose bite was mortal. The town of Tænarus was at the distance of about 40 stadia from the promontory. This town, as well as the promontory, received its name from Tænarus, a son of Neptune.

TÆNIA. Tape-worm. In zoology, a genus of the class vermes, order intestina. Body flat, and composed of numerous articulations: head with four orifices for suction a little below the mouth; mouth terminal, continued by a short tube into two ventral canals, and generally crowned with a double series of retractile hooks or holders. Ninety-one species.

These are destined to feed on the juices of various animals, and are mostly found in the alimentary canal, usually at the upper part of it. They sometimes exist in great numbers, and occasion very distressing ailments. They have the power of reproducing parts which have been broken off, and are therefore removed with considerable difficulty. They are oviparous, and discharge their numerous eggs from the apertures on the joints. They are thus divided and subdivided.

A. Found in other parts besides the intestines, and furnished with a vesicle behind. These are called hydatids: the greater number of them infest mammals, few tribes of which are free from their depredation; two species infests reptiles, and have been found in the salamander and in serpents; and one fishes, and has been found in the liver of the trout.

B. Found in the intestines only, and without the terminal vesicle. These again are subdivided as infesting mammals, birds, and fishes.

C. Head unarmed, with hooks. Subdivided as infesting mammals, birds, reptiles, and fishes.

The following are chiefly worthy of notice.

Belonging to the above division A.

1. T. visceralis. Pisciform, inclosed in a vesicle; broad on the fore-part and pointed behind. Found in the liver, placenta, sack containing the dropsical fluid, and other morbid tumours of mankind; sometimes solitary; sometimes gregarious.

2. T. cellulosa. Solitary, and inclosed in a cartilaginous vesicle and bicaudate tunic. Inhabits the cellular substance of the muscles of man; about an inch long, half as much broad, and one-fourth as thick; is very tenacious of life; head furnished with obtuse hooks.

3. T. hydatigena. Single; body elongated, and gradually widening towards the head, terminated by a vesicle which is twice as long and broad as the fore-part; head sessile, distinct. Inhabits the liver of the Norway rat, black rat, and water-rat; from one and a half to eight and a half inches long.

4. T. ferarum. Single, round, clavate; the animalcule contiguous, and confluent on the lower part, with the oval oblong vesicle. Inhabits the omentum, peritonæum, and liver of stags and antelopes; size of a nut or walnut, and sometimes as large as a hen's egg.

5. T. cerebralis. Aggregate; numerous animalcules united by their base to a large common vesicle, distributed about the surface, and retractile within it: no exterior vesicle. Found in vast number in the brain, or spinal marrow, or immediately beneath the brain of sheep. These noxious animalcules occasion giddiness and staggering, and the disease known by the name of dunt or rickets; which, if the vesicle containing be broken, is incurable: for these minute worms, in size not larger than a grain of sand, are each of them furnished with from thirty-two to thirty-six hooks on the head, by which they fix themselves firmly to the substance of the brain or its coats. They chiefly attack yearling lambs.

6. T. granulosa. Aggregate; numerous animalcules inclosed in a common vesicle and adhering loosely to the sides; external and internal vesicle callous. Found in the liver of sheep; the vesicles from the size of a nut to that of a hen's egg, and containing each many thousand animalcules swimming in the fluid with which it is filled; they are hardly visible to the naked eye; short, thick, punctured, and obtuse at both ends.

Belonging to the division B.

7. T. solium. Articulations long and narrower with marginal mouths, one on each joint, and generally alternate; ovaries arborescent.

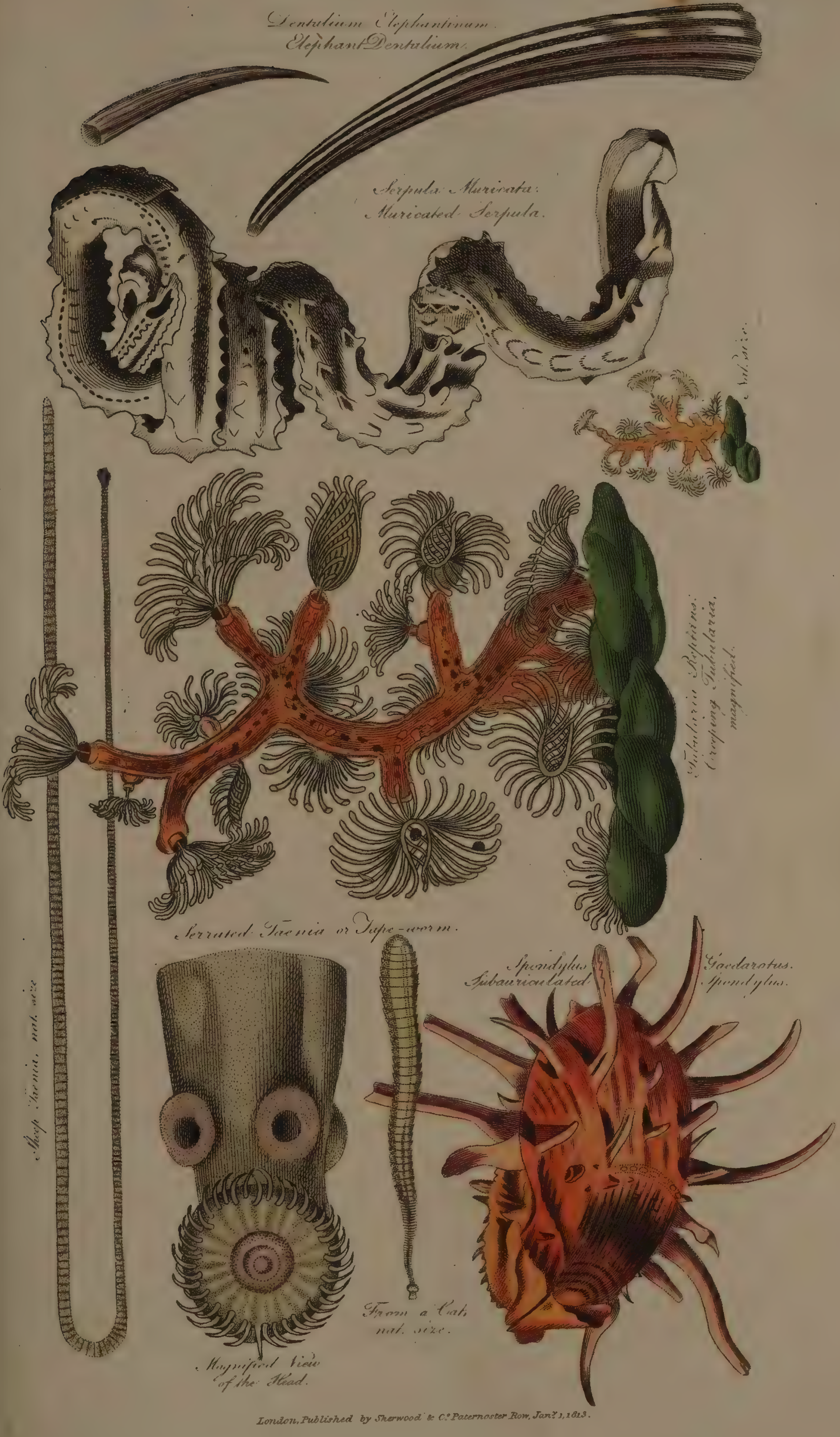
Inhabits the intestines of mankind, generally at the upper part of the alimentary canal, where it feeds on the chyle and juices already animalized; from three to thirty feet long, and has been found as long as sixty feet. It is sometimes solitary, but generally in considerable numbers, and produces emaciation and various distressing maladies; and adheres so firmly to the intestine that it is removed with great difficulty.

Head with a terminal mouth surrounded with two rows of radiate hooks or holders; and a little beneath on the flattened surface four tuberculate orifices or suckers, two on each side; body composed of a number of distinct joints, appearing as if sheathed in each other, each joint with a lateral marginal pore by which it attaches itself to the intestines; those near the head a little smaller, enlarging towards the middle, and gradually lessening towards the tail; tail terminated by a semicircular joint without any aperture.

8. T. vulgaris. Articulations short and broader, with a mouth in the center of each joint; ovaries stellate round the mouth; broader in the middle, and tapering towards both ends; joints much narrower and broader than the last, finely striate longitudinally, and wrinkled transversely at the sides.

Inhabits the intestines of mankind; and, like the last, feeds on the chyle; sometimes found three or four together; and is from one

NATURAL HISTORY.


Dentalium Elephantinum.
Elephant Dentalium.
Serpula Muricata.
Muricated Serpula.
Nat. size.
Tubularia Reptans:
Creeping Tubularia,
magnified.
Serrated Taenia or Tape-worm.
Sheep Taenia, nat. size.
Spondylus Gaedarotus.
Subauriculated Spondylus.
Magnified View
of the Head.
From a Cat,
nat. size.

London, Published by Sherwood & Co. Paternoster Row, Jany. 1, 1813.

to five yards long: so tenacious as to resist the most violent remedies.

The remaining species under this division are chiefly denominated from the animals they principally infest; and these are the dog, wolf fox, cat, squirrel, dormouse, mole, hedgehog, horse, and goat, among mammals; parrot, crow-tribe, oriole, woodcock, coot, plover, lapwing, turtle-dove, thrush, nutcracker, woodpecker, duck, sparrow, and redpole, among birds; and pike, perch, ruffe, eel, and dace, among fishes.

Belonging to the division C.

9. T. lata. White; joints very short and knotty in the middle, with a single mouth on each. Inhabits the intestines of mankind, principally the inhabitants of Switzerland and Russia, and is very rare in our own country; from six to forty yards long; more easily expelled than the other.

This division also affords a great variety of species common to other animals in the same manner as the preceding; and as in that the specific name being derived from the animal it principally infests. See Nat. Hist. Pl. CLXXV.

TAFALA, or TAFALLA, a town of Spain, in Navarre, with a castle, seated on the Cidazzo, in a country producing good wine, 18 miles S. of Pampeluna. Lon. 1. 36 W. Lat. 42. 29 N.

TAFFETY, or TAFFETA, in commerce, a fine smooth silken stuff, remarkably glossy. There are taffeties of all colours, some plain, and others striped with gold, silver, &c. others chequered, others flowered, &c. according to the fancy of the workmen.

TAG. *s.* (*tag*, Islandish.) 1. A point of metal put to the end of a string. 2. Any thing paltry and mean (*L'Estrange*). 3. A young sheep.

To TAG. *v. a.* 1. To fit any thing with an end, or point of metal: as, *to* tag *a lace*. 2. To fit one thing with another, appended (*Dryden*). 3. To join: this is properly *to tack* (*Swift*).

TAGARA, a city of ancient India, the metropolis of a large district called Ariaca, which comprehended the greatest part of the Subah of Aurangabad, and the southern part of Concan. Arrian says, that it was situated about ten days journey to the eastward of Pultanah; which, according to the rate of travelling in that country with loaded carts, might be about 100 British miles. This fixes its situation at Deoghir, a place of great antiquity, and famous through all India on account of the pagodas of Elousa. It is now called Douletabad.

TAGETES, in botany, a genus of the class syngenesia, order polygamia superflua. Receptacle naked; seeds crowned with five erect awns; calyx simple, one-leafed, five-toothed, tubular; florets of the ray five, permanent. Eight species; natives of South America, or the Canaries. The following are cultivated.

1. T. patula. French marygold. Leaves pinnate, with lanceolate, serrate, and ciliate leaflets; peduncles one-flowered, much thickened at the tip; calyx smooth; stem spreading.

2. T. erecta. African marygold. Leaves pinnate, with lanceolate, serrate, and ciliate leaflets; peduncles one-flowered, much thickened at the top; calyx angular, stem erect.

3. T. minuta. Leaves pinnate with lanceolate, serrate leaflets; the terminal ones somewhat decurrent; peduncles many-flowered, scaly; flowers contracted.

These three species are annual plants: the first and second are natives of Mexico, and have each some varieties arising from culture. They are propagated by sowing the seeds in spring on a moderately hot-bed. When the young plants come up, they must have air allowed them, and when three inches high, should be removed to another hot-bed, which should be arched over with hoops, that it may be covered with mats. They are to be planted here at about eight inches distance, and when they are grown stronger, as about the beginning of May, they are to be taken up, with a ball of earth about their roots, and placed where they are to remain, or else at eighteen inches distance, in a nursery, where, when they flower, the finest sorts may be marked, and removed with a large ball of earth to their roots, either into pots, or into the borders of the flower-garden. They are very beautiful, but their smell is offensive. The third sort grows naturally in Chili, and being a plant of little beauty, is only preserved in gardens for the sake of variety.

TAGUS. See TAJO.

TAIL. *s.* (ꞇæᵹl, Sax.) 1. That which terminates the animal behind; the continuation of the vertebres of the back hanging loose behind (*More*). 2. The lower part (*Deut.*). 3. Any thing hanging long; a catkin (*Harvey*). 4. The hinder part of any thing (*Butler*). 5. *To turn* TAIL. To fly; to run away (*Sidney*).

To TAIL. *v. n.* To pull by the tail (*Hudib.*).

TAIL. Cauda. In botany, a process or thread terminating a seed, and facilitating its propagation. This term was used formerly for the narrow base of a petal in a polypetalous corol, which Linnéus calls unguis, the claw.

TAIL, or ESTATES TAIL, are either general or special. Tail general, is where lands and tenements are given to one and the heirs of his body begotten, which is called tail general; because, how often soever such donee may be married, his heirs, by every such marriage, are capable of inheriting the estate tail. Tenant in tail special, is where the gift is restrained to certain heirs of the grantee, and not to all in general, which may happen several ways. Estates tail are likewise diversified by the distinction of male and female, as if lands are given to a man and the heirs male of his body begotten; this is an estate in tail, male special; but if to a man and the heirs female of the body of his present wife begotten, this is an estate in tail, female special. So in case of a gift in tail male, the female line shall not inherit; and so *e converso*.

As the word heirs is necessary to create a fee, so the word body or some other words of procreation are necessary to make a fee tail, and ascertain to what heirs the estate is limited. Therefore, if the words of inheritance or procreation are omitted, although the others are inserted, this will not make an estate tail. As if an estate is granted to a man and the issue of his body, this is only an estate for life, the words of inheritance being wanting; and a grant to a man, and his heirs male or female, is an estate in fee simple, not in fee tail, as there are no words to ascertain the body from whence they shall issue. Though in wills, where greater latitude is given, an estate tail may be devised by the words, to a man and his heirs male, or other irregular modes of expression.

The incidents to a tenancy in tail are principally these:

1 A tenant in tail may commit waste on an estate without being impeached for the same.

2. That the wife shall have her dower of the estate tail.

3. That the husband of a female tenant in tail may be tenant by courtesy.

4. An estate tail may be barred or destroyed by a fine, a recovery, or lineal warranty, descending with assets to the heir.

And by stat. 26 Hen. VIII. c. 13. all estates tail (in common with all estates of inheritance) are forfeited to the king on conviction of high treason.

By stat. 32 Hen. VIII. c. 28. certain leases which do not tend to the prejudice of the heir are allowed to bind the issue in tail. A stat. of the same year, c. 36. declares a fine duly levied by a tenant in tail to be a complete bar to all persons claiming under such entail.

And lastly, by 33 Hen. VIII. c. 39. all estates tail are liable to be charged for debts to the king by record or special contract.

They are likewise subject to be sold for the debts contracted by a bankrupt; and by the construction put on stat. 43 Eliz. c. 4. an appointment by tenant in tail, of the lands entailed to a charitable use, is good without fine or recovery.

TAI'LED. *a.* (from *tail.*) Furnished with a tail.

Tailed wasp, in entomology. See Sirex.

TAI'LLAGE. *s.* (*tailler*, Fr.) A piece cut out of the whole; a share of a man's substance paid by way of tribute (*Cowell*).

TAI'LLE. *s.* The fee which is opposite to fee simple, because it is so minced or pared that it is not in his free power to be disposed of who owns it; but is, by the first giver, cut or divided from all other, and tied to the issue of the donee (*Cowell*).

TAI'LOR. *s.* (*tailleur*, Fr.) One whose business is to make clothes (*Collier*).

To TAINT. *v. a.* (*teindre*, Fr.) 1. To imbue or impregnate with any thing (*Thomson*). 2. To stain; to sully (*Milton*). 3. To infect; to poison; to disease (*Pope*). 4. To corrupt (*Swift*). 5. A corrupt contraction of *attaint*.

To Taint. *v. n.* To be infected; to be touched with something corrupting (*Shakspeare*).

Taint. *s.* (*teinte*, Fr.) 1. A tincture; a stain. 2. An insect (*Brown*). 3. Infection; corruption (*Locke*). 4. A spot; a soil; a blemish (*Shakspeare*).

TAI'NTLESS. *a.* (from *taint.*) Free from infection; pure (*Swift*).

TAI'NTURE. *s.* (*teinture*, Fr.) Taint; tinge; defilement (*Shakspeare*).

TAJO, or Tagus, a river which has its source on the confines of Arragon, in Spain, runs through New Castile, by Aranjuez, Toledo, and Talavera, whence it proceeds by Alcantara, in Estremadura; when entering Portugal, it flows by Abrantes and Santaren, below which it forms the harbour of Lisbon, and then enters the Atlantic ocean.

TAI-OUAN, a city and seaport, capital of the island of Formosa. The streets are nearly straight, from 30 to 40 feet in breadth, and some of them above two miles in length. They are covered seven months in the year with awnings to defend them from the heat of the sun. The harbour is sheltered from every wind. It is seated on the W. side of the island. Lon. 120. 30 E. Lat. 23. 25 N.

TAI-PING, a city of China, of the first rank, in the province of Kiang-nan, seated on the Kian-ku, 25 miles S.S.W. of Nan-king. Lon. 119. 15 E. Lat. 32. 26 N.

Tai-ping, a strong city of China, of the first rank, in the province of Quang-si, seated on a point of land, almost surrounded by a river, 360 miles W. by S. of Canton. Lon. 107. 0 E. Lat. 22. 36 N.

TAI-TCHEOU, a city of China, of the first rank, in the province of Tchekiang, seated on the bank of a river, in a mountainous country, 720 miles S.S.E. of Peking. Lon. 121. 2 E. Lat. 28. 55 N.

TAI-TONG, a strong city of China, of the first rank, in the province of Chan-si, seated near the great wall, in a mountainous country, 155 miles W. of Peking. Lon. 113. 0 E. Lat. 40. 5 N.

TAI-YUEN, a city of China, capital of the province of Chan-si. It is eight miles in circumference, but much decayed since it was the residence of the princes of the last imperial family of Tai-ming-tchao. It is 230 miles S.W. of Peking. Lon. 111. 56 E. Lat. 37. 54 N.

To TAKE. *v. a.* preterit *took*; part. pass. *taken*, sometimes *took*. (*taka*, Islandish.) 1. To receive what is offered (*Dryden*). 2. To seize what is not given (*Dryden*). 3. To receive (*Deuteronomy*). 4. To receive with good or ill will (*Swift*). 5. To lay hold on; to catch by surprise or artifice (*Clar.*). 6. To snatch; to seize (*Hale*). 7. To make prisoner (*Knolles*). 8. To captivate with pleasure; to delight; to engage (*Locke*). 9. To entrap; to catch in a snare (*Canticles*). 10. To understand in any particular sense or manner (*Wake*). 11. To exact (*Leviticus*). 12. To get; to have; to appropriate (*Genesis*). 13. To use; to employ (*Watts*). 14. To blast; to infect (*Shakspeare*). 15. To judge in favour of; to adopt (*Dryden*). 16. To admit any thing bad from without (*Hudibras*). 17. To get; to procure (2 *Maccabees*). 18. To turn to; to practise (*Bacon*). 19. To close in with; to comply with (*Dryden*). 20. To form; to fix (*Clarendon*). 21. To catch in the hand; to seize (*Ezekiel*). 22. To admit; to suffer (*Dryden*). 23. To perform any action (*Hakewill*). 24. To receive into the mind (*Watts*). 25. To go into (*Hales*). 26. To go along; to follow; to pursue (*Dryden*). 27. To swallow; to receive (*Brown*). 28. To swallow as a medicine (*South*). 29. To choose one of more (*Locke*). 30. To copy (*Dryden*). 31. To convey; to carry; to transport (*Shakspeare*). 32. To fasten on; to seize (*Temple*). 33. Not to refuse; to accept (*Dryden*). 34. To adopt (*Exodus*). 35. To change with respect to place (*Ray*). 36. To separate (*Blackmore*). 37. To admit (*Swift*). 38. To pursue; to go in (*Dryden*). 39. To receive any temper or disposition of mind (*Dryden*). 40. To endure; to bear (*L'Estrange*). 41. To draw; to derive (*Tillotson*). 42. To leap; to jump over (*Shakspeare*). 43. To assume (*Loc.*). 44. To allow; to admit (*Boyle*). 45. To receive with fondness (*Dryden*). 46. To carry out for use (*Mark*). 47. To suppose; to receive in thought; to entertain in opinion (*Tate*). 48. To separate for one's self from any quantity; to remove for one's self from any place (*Dryden*). 49. Not to leave; not to omit (*Arbuthnot*). 50. To receive payments (*Shakspeare*). 51. To obtain by mensuration (*Swift*). 52. To withdraw (*Spectator*). 53. To seize with a transitory impulse; to affect so as not to last (*Arbuthnot*). 54. To comprise; to comprehend (*Locke*). 55. To have recourse to (*L'Estrange*). 56. To produce; to suffer to be produced (*Spenser*). 57. To catch in the mind (*Locke*). 58. To hire; to rent (*Pope*). 59. To engage in; to be active in (*Shakspeare*). 60. To incur; to receive as it happens (*Addison*). 61. To admit in capitulation (*Sandys*). 62. To catch eagerly (*Dryden*). 63. To use as an oath or expression (*Exodus*). 64. To seize as a disease (*Dryden*). 65. *To* TAKE *away*. To deprive of (*Pope*). 66. *To* TAKE *away*. To set aside; to remove (*Locke*). 67. *To* TAKE *care*. To be careful; to be solicitous for; to superintend (*Corinthians*). 68. *To* TAKE *care*. To be cautious; to be vigilant. 69. *To* TAKE *course*. To have recourse to measures (*Hammond*). 70. *To* TAKE *down*. To crush; to reduce; to suppress (*Addison*). 71. *To* TAKE *down*. To swallow; to take by the mouth (*Bacon*). 72. *To* TAKE *from*. To derogate; to detract (*Dryden*). 73. *To* TAKE *from*. To deprive of (*Locke*). 74. *To* TAKE *heed*. To be cautious; to beware (*Dryden*). 75. *To* TAKE *heed to*. To attend (*Ecclus.*). 76. *To* TAKE *in*. To enclose (*Mortimer*). 77. *To* TAKE *in*. To lessen; to contract: as, *he took in his sails*. 78. *To* TAKE *in*. To cheat; to gull: as, *the cunning ones were* taken in. 79. *To* TAKE *in hand*. To undertake (*Clarendon*). 80. *To* TAKE *in*. To comprise; to comprehend (*Derham*). 81. *To* TAKE *in*. To admit (*Wotton*). 82. *To* TAKE *in*. To win by conquest (*Felton*). 83. *To* TAKE *in*. To receive locally (*Tillotson*). 84. *To* TAKE *in*. To receive mentally (*Addison*). 85. *To* TAKE *notice*. To observe. 86. *To* TAKE *notice*. To show by any act that observation is made (*Clarendon*). 87. *To* TAKE *oath*. To swear (*Ezek.*). 88. *To* TAKE *off*. To invalidate; to destroy; to remove (*Sanderson*). 89. *To* TAKE *off*. To withhold; to withdraw (*Wake*). 90. *To* TAKE *off*. To swallow (*Locke*). 91. *To* TAKE *off*. To purchase (*Locke*). 92. *To* TAKE *off*. To copy (*Addison*). 93. *To* TAKE *off*. To find place for (*Bacon*). 94. *To* TAKE *off*. To remove (*Exodus*). 95. *To* TAKE *order with*. To check; to take course with (*Bacon*). 96. *To* TAKE *out*. To remove from within any place (*Shakspeare*). 97. *To* TAKE *part*. To share (*Pope*). 98. *To* TAKE *place*. To prevail; to have effect (*Locke*). 99. *To* TAKE *up*. To borrow upon credit or interest (*Swift*). 100. *To* TAKE *up*. To be ready for; to engage with (*Shakspeare*). 101. *To* TAKE *up*. To apply to the use of (*Addison*). 102. *To* TAKE *up*. To begin (*South*). 103. *To* TAKE *up*. To fasten with a ligature passed under (*Sharp*). 104. *To* TAKE *up*. To engross; to engage (*Duppa*). 105. *To* TAKE *up*. To have final recourse to (*Addison*). 106. *To* TAKE *up*. To seize; to catch; to arrest (*Shakspeare*). 107. *To* TAKE *up*. To admit (*Bacon*). 108. *To* TAKE *up*. To answer by reproving; to reprimand (*L'Estrange*). 109. *To* TAKE *up*. To begin where the former left off (*Addison*). 110. *To* TAKE *up*. To lift (*Ray*). 111. *To* TAKE *up*. To occupy (*Hammond*). 112. *To* TAKE *up*. To manage in the place of another (*L'Estrange*). 113. *To* TAKE *up*. To comprise (*Dryden*). 114. *To* TAKE *up*. To adopt; to assume (*Atterbury*). 115. *To* TAKE *up*. To collect; to exact a tax (*Knolles*). 116. *To* TAKE *upon*. To appropriate to; to assume; to admit to be imputed to (*Dryden*). 117. *To* TAKE *upon*. To assume; to claim authority (*Felton*).

To TAKE. *v. n.* 1. To direct the course; to have a tendency to (*Dryden*). 2. To please; to gain reception (*Bentley*). 3. To have the intended or natural effect (*Dryden*). 4. To catch; to fix (*Bacon*). 5. *To* TAKE *after*. To learn of; to resemble; to imitate (*Atterbury*). 6. *To* TAKE *in with*. To resort to (*Bacon*). 7. *To* TAKE *on*. To be violently affected (*Shakspeare*). 8. *To* TAKE *on*. To claim a character (*Shakspeare*). 9. *To* TAKE *on*. To grieve; to pine (*Shakspeare*). 10. *To* TAKE *to*. To apply to; to be fond of (*Swift*). 11. *To* TAKE *to*. To betake to; to have recourse (*Addison*). 12. *To* TAKE *up*. To stop (*South*). 13. *To* TAKE *up*. To reform (*Locke*). 14. *To* TAKE *up with*. To be contented with

(*Bentley*). 15. *To* Take *up with.* To lodge; to dwell (*L'Estrange*). 16. *To* Take *with.* To please (*Bacon*).

TA'KEN. The participle passive of *take*.

TA'KER. *s.* (from *take.*) He that takes (*Shakspeare*).

TA'KING. *s.* (from *take.*) Seizure; distress of mind (*Shakspeare*).

TALACUDA, a town of Hindustan, in Mysore, on the N. bank of the Cavery. It has a celebrated temple; and the tops of some others are to be seen, between the town and the river, which for many years have been overwhelmed by sand-hills. It is 24 miles E.S.E. of Mysore.

TALAVERA, a town of Spain, in New Castile, with a fort. It has manufactures of silk, and a pottery. It is seated on the Tajo, in a valley abounding in corn, fruits, and excellent wine, 58 miles S.W. of Madrid. Lon. 4. 1 W. Lat. 39. 41 N. Here, as is well known, the marquis of Wellington obtained a signal victory over the French.

TA'LBOT. *s.* A hound.

TALCUM. Talc. In mineralogy, a genus of the class earths, order talcose. Consisting principally of carbonat of magnesia, silex, and carbon; soft, greasy to the touch, not admitting a polish; hardening in the fire, not effervescing with nitric acid, absorbing oil. Eleven species; of which the following are the chief.

1. T. spuma maris. Keffekil; sea-froth. Spuma maris. Myrsen. Whitish, tenacious, hardening in the air. Found in small veins covered with soil in Anatolia, near Koni, Thrace, Greece, and North America: colour white and yellowish-white; consistence waxy when fresh; adheres to the tongue, and absorbs water: specific gravity 1.600: contains, silex 50.50; magnesia 17.25; water 25.00; carbonic acid 5.00; lime 1.50. *Klaproth.* It is used to make the bowls of Turkish tobacco pipes.

2. T. fullonum. Tinged, tenacious. Found in Cornwall and Bedfordshire, Portugal, and Saxony, in large masses under the common soil: colour yellowish, or greenish-grey, greenish-white, green, or flesh-colour. It is used to take spots of grease out of cloth.

3. T. chlorites. Chlorite. Chlorit. Peach. Friable, scaly, green, gives an earthy smell when breathed upon; melting with a greater heat into a dark brown glass. Found in Switzerland and Saxony in primitive mountains and rock crystal: colour glass or dark-green; has a scaly texture, and glittering appearance.

4. T. cosmeticum. Talcose mica. Somewhat flexible, diaphonous, undulately lamellous, shining, breaking into discoid fragments. Found in Naples, Saxony, Silesia, Tyrol, and Sweden; colour pale-green, silvery, greenish-grey, green, red, yellow, or yellowish; strongly heated it becomes whiter, less transparent, and more brittle: contains silex 48.0; alumina 37.0; oxyd of iron 6.0; magnesia 1.5; water 5.0. *Chevenix.*

5. T. brianzonicum. Spanish chalk. Semi-undurated steatite. Rigid, without transparency, leaving a mark, very minutely lamellous. Found in amorphous masses in France and Spain; colour white or greenish; absorbs, but does not diffuse itself in water; hardens and whitens in the fire: contains silex 48.42; magnesia 20.84; alumina 14; iron 1; air and water 16. *Klaproth.*

6. T. smectis. Soap-stone. Steatites. Rigid, without transparency, shining when rubbed, leaving a white mark, of shivery fracture, subdiaphonous, apyrous. Several varieties. Found in Cornwall, China, Norway, Sweden, Saxony, and Germany; colour white, or greenish-white, greyish-green, yellowish, or reddish, sometimes veined; does not adhere to the tongue; soft and soapy, and may be cut into any shape: melts with borax and soda into a greenish slag.

7. T. ollaris. Potstone. Rigid, opake, without transparency, undulately lamellous, breaking into discoid fragments. Found imbedded in amorphous masses in Russia, Norway, Saxony, and many parts of Europe; colour pale-yellowish, or greenish-grey, or speckled with red, and contains many micaceous particles; does not diffuse itself in water, but gradually crumbles to pieces; is brittle and too hard for writing, but is made into utensils for holding water: contains silex 38; magnesia 38; alumina 7; iron 5; carbonat of lime 1; fluoric acid 1. *Weigleb.*

TALE. *s.* (zale, Sax.) 1. A narrative; a story (*Watts*). 2. Oral relation (*Shakspeare*). 3. Number reckoned (*Hooker*). 4. Reckoning; numeral account (*Carew*). 5. Information; disclosure of any thing secret (*Bacon*).

TALEBE'ARER. *s.* (*tale* and *bear.*) One who gives officious or malignant intelligence (*L'Estrange*).

TALEBE'ARING. *s.* (*tale* and *bear.*) The act of informing; officious or malignant intelligence (*Arbuthnot*).

TALENT, signifies both a weight and a coin very common among the ancients, but very different among different nations. The common Attic talent of weight contains 60 Attic minæ, or 6000 Attic drachmæ; and weighed, according to Dr. Arbuthnot, 56 lbs. 11 oz. $17\frac{1}{7}$ gr. English troy weight. There was another Attic talent, by some said to consist of 80, by others of 100 minæ. The Egyptian talent was 80 minæ; the Antiochian also 80; the Ptolemaic of Cleopatra $86\frac{2}{3}$; that of Alexander 96; and the Insular talent 120. In the valuation of money, the Grecian talent, according to Dr. Arbuthnot, was equal to 60 minæ, or, reckoning the minæ at 3*l.* 4*s.* 7*d.* equal to 193*l.* 15*s.* The Syrian talent in this valuation consisted of 15 Attic minæ; the Ptolemaic of 20; the Antiochian of 60; the Euboic of 60; the Babylonic of 70; the Greater Attic of 80; the Tyrian of 80; the Eginean of 100; the Rhodian of 100; and the Egyptian of 80 minæ.

There is another talent much more ancient, which Dr. Arbuthnot calls the Homeric talent of gold, which seems to have weighed six Attic drachms or three darics, a daric weighing very little more than a guinea. According to this talent, some reckon the treasure of king David, particularly that mentioned 1 Chron. xxii. 14. which, according to the common reckoning, would amount in gold talents to the value of 547,500,000*l*. and the silver to above 342,000,000*l*; or, reckoning according to the decuple proportion of gold to silver, the two sums would be equal. As David reigned in Judæa after the siege of Troy, it is not improbable but Homer and he might use the same numeral talent of gold.

Talent, as a species of money, among the Hebrews, was sometimes used for a gold coin, the same with the shekel of gold, called also stater, and weighing only 4 drachms. The Hebrews reckoned by these talents as we do by pounds, &c. Thus a million of gold, or million of talents of gold, among them, was a million of shekels or nummi; the nummus of gold being the same weight with the shekel, viz. four drachms. But the Hebrew talent weight of silver, which they called cicar, was equivalent to that of 3000 shekels, or 113lb. 10 oz. 1 dwt. $10\frac{2}{7}$ gr. English Troy weight, according to Arbuthnot's computation.

Talent denotes, 2. Faculty; power; gift of nature. 3. Quality; disposition.

TA-LI, a city of China, of the first rank, in the province of Yun-nan. Here are made curious tables and ornaments of fine marble, which is naturally beautified with different colours, representing mountains, flowers, trees, and rivers. It is 160 miles W.N.W. of Yunnan. Lon. 100. 6 E. Lat. 24. 54 N.

TALINUM, in botany, a genus of the class dodecandria, order monogynia. Calyx two or five-leaved; corol five-petalled; capsule three-valved, many-seeded; seeds coated. Seven species, natives of America, the Cape, or Arabia; some with white, others with red-violet flowers.

TALISMANS, magical figures cut or engraved with superstitious observations on the characterisms and configurations of the heavens, to which some astrologers have attributed wonderful virtues, particularly that of calling down celestial influences. The talismans of Samothrace, so famous of old, were pieces of iron formed into certain images, and set in rings; these were esteemed preservatives against all kinds of evils. There were likewise talismans taken from vegetables, and others from minerals.

TA'LISMANIC. *a.* Magical.

To TALK. *v. n.* (*taelen*, Dutch.) 1. To speak in conversation; to speak fluently and familiarly; to converse (*Addison*). 2. To prattle; to speak impertinently (*Milton*). 3. To give account (*Addison*). 4. To speak; to reason; to confer (*Collier*).

Talk. *s.* (from the verb.) 1. Oral conversation; fluent and familiar speech (*Knolles*). 2. Report; rumour (*Locke*). 3. Subject of discourse (*Milton*).

Talk. *s.* (*talc*, French.) A kind of stone, composed of parallel plates (*Woodward*).

TA'LKATIVE. *a.* (from *talk.*) Full of prate; loquacious (*Addison*).

TA'LKATIVENESS. *s.* (from *talkative.*) Loquacity; garrulity (*Swift*).

TA'LKER. *s.* (from *talk.*) 1. One who talks (*Watts*). 2. A loquacious person; a prattler (*Locke*). 3. A boaster; a bragging fellow (*Taylor*).

TA'LKY. *a.* (from *talk.*) Consisting of talk; resembling talk (*Woodward*).

TALL. *a.* (*tàl*, Welsh.) 1. High in stature (*Milton*). 2. High; lofty (*Waller*). 3. Sturdy; lusty (*Shakspeare*).

TA'LLAGE. *s.* (*taillage*, French.) Impost; excise.

TA'LLOW. *s.* (*talge*, Danish.) The grease or fat of an animal; coarse suet (*Abbot*).

To Ta'llow. *v. a.* (from the noun.) To grease; to smear with tallow.

TA'LLOWCHANDLER. *s.* (*tallow* and *chandelier*, French.) One who makes candles of tallow (*Harvey*).

TALLOW-TREE. There are various plants whose expressed oil is sufficiently thick and in sufficient abundance to answer the purpose of tallow, and to be employed, instead of animal oil, in the manufacture of candles, and which are hence called tallow-trees. Of these, the chief are the croton sebiferum, and the tomex sebifera, both natives of China; the former, a monœcian monadelphian plant, with rhombic-ovate leaves, pointed, very entire, and glabrous; the latter a dodecandrian monogynian plant, with glabrous leaves, and corols without florets; it is about the height of a cherry-tree, its leaves in form of a heart, of a deep shining red colour, and its bark very smooth. Its fruit is inclosed in a kind of pod, or cover, like a chesnut, and consists of three round white grains, of the size and form of a small nut, each having its peculiar capsule, and within a little stone. This stone is encompassed with a white pulp which has all the properties of true tallow, both as to consistence, colour, and even smell, and accordingly the Chinese make their candles of it; which would doubtless be as good as those in Europe, if they knew how to purify their vegetable, as well as we do our animal, tallow. All the preparation they give it is to melt it down, and mix a little oil with it, to make it softer and more pliant. It is true their candles made of it yield a thicker smoke, and a dimmer light than ours; but those defects are owing in a great measure to the wicks, which are not of cotton, but only a little rod of dry light wood covered with the pith of a rush wound round it; which, being very porous, serves to filtrate the minute parts of the tallow, attracted by the burning stick, which, by this means, is kept alive.

In like manner the Americans make wax candles of the waxy berry of the myrica cerifera or candle-berry myrtle, which burn with a fine clear light, for a long time, and possess a fragrant myrtle odour. See **Croton**, **Tomex**, and **Myrica**.

TALLY, or **Taile**, **Taille**, a piece of wood, whereon retail traders use to score or mark, by notches or incisions, the several quantities of goods they deliver out on credit, to save the trouble of writing down so many little articles in books.

Each score consists of two pieces of wood, or rather of a single piece cleft lengthwise, the parts whereof falling in with one another, the things delivered are scored on both at the same time; the seller keeping one, and the buyer the other.

Tallies are taken as evidences in courts of justice, as much as books. The ancient way of keeping all accounts was by tallies; the debtor keeping one part, and the creditor the other. Hence the tallier of the exchequer, now called the teller.

There are three kinds of tallies mentioned in our statutes, and long used in the exchequer; viz.

Tallies of loans, one part whereof is kept in the exchequer, and the other part given to particular persons, in lieu of an obligation for the monies they have lent to the government on acts of parliament.—This last part is called the stock, and the former the counter-stock, or the counter-tail.

The tallies are numbered, and bear the person's name, and the sum lent: thus we say, the tallies, No. have been paid, or discharged: tallies are risen, fallen, 4, 5, &c.

Tallies, or *Tailes of debt*, are a kind of acquittances for debts paid to the king.

E. gr. the university of Cambridge pays yearly 10*l.* for such things as are by charter granted them in fee-farm. He that pays this, receives a taile, or tally for his discharge, with which or a note of it, he repairs to the clerk of the pipe, and there for the tally receives a full discharge on parchment.

Tallies of reward, or allowance: these are made to sheriffs, for such matters as (to their charge) they have performed in their office, or such money as is by course cast on them in their accounts, but which they cannot levy.

In the exchequer there is a tally-court, where attend the two deputy chamberlains of the exchequer, and the tally-cutter.

To Ta'lly. *v. a.* (from the noun.) To fit; to suit; to cut out, so as to answer any thing (*Prior*).

To Ta'lly. *v. n.* To be fitted; to conform; to be suitable (*Addison*).

TALMUD, or **Thalmud**, from תלמוד, *doctrine*, from למד, *he taught*, a Jewish book, wherein is collected all that relates to the explication of their law.

The Talmud is the body of the Hebrew law: a compilation of expositions of the duties imposed on that people, either in Scripture, or by tradition, or by authority of their doctors, or by custom, or even by superstition: to speak more plainly still, it is the course of cases of conscience, or of moral theology, wherein the duties are explained, and the doubts cleared, not by reasoning, but generally by authority, by the custom of the nation, and by the decisions of the most approved of the ancient doctors.

The Talmud consists of two general parts: the one called the Mischna, the other the Gemara; which first part is also frequently called absolutely the Talmud, the general name of the whole work.

The Jews divide their law into written, which is that contained in the books of Moses; and unwritten, which is that conveyed by tradition.—This latter is, in effect, no other than a gloss or interpretation of the former, given by the ancient rabbins.

The Talmud then contains the traditions of the Jews, their polity, doctrine, and ceremonies, which they observe as religiously as the law of God itself: they would never put them in writing till they were compelled to it by the destruction of Jerusalem, and till they saw themselves dispersed throughout the world.

They had two famous schools; the one at Babylon, and the other at Jerusalem: in these they made two several collections of those traditions; the first at Jerusalem, the other at Babylon; but both called Talmud, and both exceedingly reverenced, especially the Babylonian, though full of extravagancies. It was compiled by the Jews of Mesopotamia, about 500 years after Christ, according to Buxtorf; but father Morinus offers several reasons to prove, that it was not finished till the year 700. The last edition of this Talmud at Amsterdam is in twelve folios.

The Talmud of Jerusalem is the least esteemed.—It was compiled by the Jews of that city, and particularly by rabbi Jochanan, rector of the academy at Tiberias, about 300 years after Christ, according to Buxtorf; but father Morinus in his Exercitationes Biblicæ, lib. ii. exerc. 6. judges from several barbarous terms found in it, of Vandalic or Gothic extraction, that it did not appear till the 5th century. This is published in one large folio.

The Babylonian Talmud consists of two parts: the one the text, the other the gloss or comment; the comment, called the Gemara, contains the decision of the Jewish doctors, and their expositions of the text.—This we find stuffed with dreams and chimæras; together with much ignorance, and many impertinent questions and disputations: the style is also very coarse.—On the contrary, the text, called the Mischna, is written in a tolerably pure style, and the reasonings generally much more solid.

The Jews pretend, that this was composed by rabbi Juda, surnamed the *Saint*; and that God revealed to him the doctrine and the chief mysteries thereof.—But this is only to be understood of the Mischna, not of the Gemara, the compilation whereof was not begun till the sixth century, after the destruction of the second temple.

Rabbi Juda is said to have composed the Mischna under the empire of Antoninus, in the second century: but they do not all agree about this antiquity, some carrying it back much farther.

It is the Talmud of Babylon that is usually read, and most frequently consulted among the Jews; so that when they say simply the Talmud, they always mean this; never quoting the other without the addition of Jerusalem.

Maimonides has made an abridgment of the Talmud, which Scaliger prefers to the Talmud itself; as being purged of many of the fables wherewith the other is full. It is a system of the laws and customs of the Jews, both of their civil and their canon law, and the best of their traditions.

TA'LNESS. *s.* (from *tall.*) Height of stature; procerity.

TALON, in ornithology, the claw of a bird.

TALON, in architecture, a kind of moulding, consisting of a cymatium, crowned with a square fillet; frequently found to terminate ornaments of joiners-work, as those of doors, &c.

The word is French, and literally signifies heel.

The talon, more properly so called, is a moulding concave at the bottom, and convex at top; having an effect just opposite to the doucine.

TALPA. Mole. Fore-teeth unequal, upper six, lower eight: tusks solitary, upper larger; grinders upper seven, lower six. Four species. These live under the earth, dig cylindrical tubes, feed chiefly on worms; head thick, lengthened into a snout; eyes very small, covered; earless; body thick; legs short, fore-feet broad, large, shorter than the hind-feet, with longer claws.

1. T. Europæa. European mole. Tail short; feet five-toed. Four other varieties, from variety of colour, white, yellow, cinereous, or diversified. The fore-part of the body is thick and muscular; the hind-part taper. The fore-feet are placed obliquely; they are broad, and have the appearance of hands, with five fingers each, terminated by strong claws. The hind-feet are very small; tail very short; and skin so tough as scarcely to be cut through. The hair is close, short, and softer than the finest velvet. It is about five inches and three quarters in length; its tail one. It inhabits Europe, except Ireland, and Siberia as far as the river Lena; but the Siberian is much larger than the European mole. It is found also in the north of Asia and Africa. It lives under ground; burrows with vast rapidity, with its fore-feet; flings the earth back with its hind-feet; has the sense of smelling in an exquisite degree, which directs it to its food, consisting of worms, insects, and roots: it does vast damage in gardens, and is most active before rain, worms being then in motion: it breeds in the spring; brings four or five young at a time: it raises no hillocks in dry weather: utters a scream when taken. Palma christi and white hellebore, made into a paste and laid in their holes, is said to destroy them. There is a variety in North America resembling the European, but larger, with hair soft, silky, and glossy, of a yellowish brown colour, brightest about the head, darkest about the rump; with a brown belly: its feet and tail are white.

2. T. Asiatica. Cape or Siberian mole. Tailless: fore-feet three-toed.

The Cape mole, called by Mr. Pennant the Siberian, though he says it inhabits the Cape of Good Hope and not Siberia, has a short blunt nose; from each corner of its mouth a broad whitish bar, pointing upwards along the sides of its head: body above varied with hair of a glossy green, and copper-colour: below brown. While each of the fore-feet has three toes with vast claws, each of the hind-feet has five small toes, with weak claws.

3. T. longicaudata. Long-tailed mole. Tail half the length of the body; feet five-toed, hind-feet scaly.

This mole has a radiated nose, and inhabits North America; the claws on the fore-feet are like those of the common mole; those on the hind-feet are very long and slender: hair soft, long, and of a rusty brown: four inches and a half long; tail two.

4. T. rubra. Red mole. Tail short; fore-feet three-toed; hind-feet four-toed.

The history of the red mole rests on the authority of Seba, who is not so particular as to inform us whether it inhabits North or South America. He says that in the form of its body and tail it is like the European kind, but somewhat larger, and that its tail is thicker at the root.

TALTHYBIUS, a herald in the Grecian camp during the Trojan war, the particular minister and friend of Agamemnon. He brought away Briseis from the tent of Achilles, by order of his master. Talthybius died at Ægium in Achaia.

TALUS, a youth, son of the sister of Dædalus, who invented the saw, compasses, and other mechanical instruments. His uncle became jealous of his growing fame, and murdered him privately.

TALUS, in anatomy. A synonym of astragalus. See ASTRAGALUS.

TALUS, or TALUD, in architecture, the inclination or slope of a work; as of the outside of a wall, when its thickness is diminished by degrees, as it rises in height, to make it the firmer.

TALUS, or TALUD, in fortification. Talus of a bastion, or rampart, is the slope or diminution allowed to such a work; whether it be of earth, or stone; the better to support its weight.

The exterior talus of a work is its slope on the side towards the country; which is always made as little as possible, to prevent the enemies escalade, unless the earth be bad, and then it is absolutely necessary to allow a considerable talus for its parapet, and sometimes to support the earth with a slight wall, called a revetement.

The interior talus of a work is its slope on the inside, towards the place.

This is larger than the former, and has, at the angles of the gorge and sometimes in the middle of the curtains, ramps or sloping roads for mounting upon the terreplain of the rampart.

Talus (Superior), of the parapet, is a slope on the top of the parapet, that allows of the soldiers defending the covert-way with small-shot, which they could not do if it were level.

TAMALAMECA, a town of Terra Firma, in the government of St. Martha, seated on the Madalena, 140 miles S. of St. Martha. Lon. 74. 15 W. Lat. 9. 6 N.

TAMALAPATRA. The Indian leaf is so termed by some authors. See Cassia lignea.

TAMAR, a river which rises in the N. part of Cornwall, on the borders of Devonshire, takes a southerly course, separating the two counties, and forms the harbour of Hamoaze, at Plymouth.

TAMARA, the capital of the island of Socotera, with a good harbour. The trade consists chiefly in aloes, frankincense, ambergrise, and dragonsblood. It is seated on a bay, on the N. coast of the island. Lon. 53. 45 E. Lat. 11. 56 N.

TAMARICA, or Itamaria, a province of Brasil, between Paraibo on the N. and Ferambuco on the S. On the coast is an island of the same name, 24 miles in length, which has a harbour and good fresh water. Lon. 35. 5 W. Lat. 7. 56 N.

TAMARIN, in zoology. See Sionia.

TAMARINDUS. Tamarind-tree. In botany, a genus of the class monadelphia, order triandria. Calyx four-parted, petals three; nectary with two short bristles under the filaments; style one; legume filled with pulp. One species only, T. indicus, a tree of India and Arabia, growing to a large size with numerous spreading branches; leaves alternate, evenly pinnate; leaflets opposite, oblong, obtuse, entire; flowers in lateral racemes; calyx spreading, deciduous, yellowish; petals yellow with red veins; legume roundish-compressed, containing three or four flattish, angular shining seeds lodged in a dark pulp, and covered by several rough longitudinal fibres.

The tamarind is cultivated as a hot-house plant in our own gardens, and increased by seeds obtained from its native soil. In medical practice the tamarind is employed as a laxative, and for abating thirst or heat in various inflammatory complaints, and for correcting putrid disorders, especially those of a bilious kind, in which the cathartic, antiseptic, and refrigerant qualities of the fruit have been found equally useful. The pulp of tamarinds is an ingredient in the electuarium e cassia and electuarium e senna.

TAMARISC. Tamariscus. (from *tamarik*, abstersion, Heb. named from its properties of cleansing and purifying the blood.) The bark, wood, and leaves of this tree, tamarix gallica of Linnéus, were formerly employed medicinally, though seldom used at present. The former for its aperient and corroborant virtues in obstructions of the liver; the latter in icterus, hæmoptysis, and some affections of the skin.

TAMARIX. Tamarisk. In botany, a genus of the class pentandria, order trigynia. Calyx five-parted, inferior; petals five; capsule one-celled, three-valved; seeds furnished with long hair. Four species; one an East Indian, the rest European trees or shrubs. Of these the two following are cultivated:

1. T. Gallica. French tamarisk. Flowers quinquemale, pale-flesh-colour; spikes lateral; leaves linear-lanceolate, clasping the stem, imbricate. Found wild in various parts of Europe and on our own sea-coasts. There is a variety in Russia, the leaves and stem of which are covered with hoary down.

2. T. Germanica. German tamarisk. Flowers ten, conjoined on a terminal spike; leaves linear-lanceolate, sessile. A variety with an annual herbaceous stem.

The first of these is a tree of a middling size, which grows in France, Spain, and Italy; and the second is a native of some moist lands in Germany: both are easily propagated by laying down their tender branches in autumn, or by planting cuttings in an east border; these should be supplied with water in dry weather, and in the following autumn be removed into a nursery to be trained up two or three years, or else into the places where they are designed to remain, taking care to mulch their roots, and water them as the season may require, till they have taken root; after which they will require no other culture but to prune off the straggling shoots, and keep the ground clean about them.

TAMASEA, a beautiful plain of Cyprus, sacred to the goddess of beauty. It was in this place that Venus gathered the golden apples with which Hippomanes was enabled to overtake Atalanta.

TAMBOF, a town of Russia, capital of a government of the same name, and a bishop's see. It is seated on the Tzna, which flows into the Mokscha, 228 miles S.E. of Moscow. Lon. 41. 4 E. Lat. 52. 48 N.

TAMBOUR, in architecture, a term applied to the Corinthian and composite capitals, as bearing some resemblance to a drum, which the French call tambour. Some choose to call it the vase, and others campana or the bell.

Tambour is also used for a little box of timber work, covered with a ceiling, withinside the porch of certain churches; both to prevent the view of persons passing by, and to keep off the wind, &c. by means of folding-doors, &c.

Tambour, also denotes a round course of stone, several whereof form the shaft of a column, not so high as a diameter.

Tambour, in the arts, is a species of embroidery. The tambour is an instrument of a spherical form, upon which is stretched, by means of a string and buckle, or other suitable appendage, a piece of linen, or thin silken stuff; which is wrought with a needle of a particular form, and by means of silken or gold and silver threads, into leaves, flowers, or other figures.

TAMBOURIN, is the nature of a dance performed on the French stage. The air is lively, and the movements are quick.

TAME, a river which rises in Staffordshire, and entering Warwickshire, flows first E. and then N. till it re-enters its native county at Tamworth, below which it joins the Trent, seven miles above Burton.

TAME. *a.* (ꞇame, Saxon; *taem*, Dutch.) 1. Not wild; domestic (*Addison*). 2. Crushed; subdued; depressed; dejected; spiritless; heartless (*Roscommon*).

To TAME. *v. n.* (ꞇemean, Saxon.) 1. To reduce from wildness; to reclaim; to make gentle (*Shakspeare*). 2. To subdue; to crush; to depress; to conquer (*Ben Jonson*).

TA'MEABLE. *a.* (from *tame.*) Susceptive of taming (*Wilkins*).

TA'MELY. *ad.* (from *tame.*) Not wildly; meanly; spiritlessly (*Swift*).

TA'MENESS. *s.* (from *tame.*) 1. The quality of being tame; not wildness. 2. Want of spirits; timidity (*Rogers*).

TA'MER. *s.* (from *tame.*) Conqueror; subduer (*Pope*).

TAMERLANE, called by his own kindred Timur-bec, or Timur-beg, meaning Timur-the-lame, was, according to some historians, the son of a shepherd, and to others, the issue of royal blood. He was born in a village belonging to the ancient Sogdiana, and early in life testified uncommon courage. This, with other great qualities, soon drew to him a vast number of followers, whom he inspired with the desire of making conquests. His first exploit was the reduction of all ancient Persia, and the capture of Bagdad. From thence he went to India, which he brought under submission, making himself master of Delhi, with the immense treasures of the Mogul empire. While he was on his second expedition, Bagdad attempted to throw off his yoke, for which that city was cruelly given up to pillage and massacre, by which, it is said, 80,000 persons lost their lives. Upon his return from his Indian exploits he entered Syria, and took Damascus. In the midst of this course of victories, the Greek emperor, who found no aid from the Christian princes, addressed himself to the Tartarean hero. Five Mahometan princes too, whom Bajazet, emperor of the Turks, had deposed near the borders of the Euxine sea, implored his aid at the same time. Tamerlane was glad of the opportunity of signalizing himself against the Turks, and a war ensued. The two armies met in the plains of Ancyra, in Phrygia, where the battle lasted three days, but terminated in favour of the Tartar. Bajazet was taken prisoner, and being asked by the conqueror what he would have done with his captive had the issue of the contest been the reverse, he answered, "I would have shut you up in an iron cage;" on which his punishment was made the same. Tamerlane died in 1595, about three years after his last conquest, namely, that of Grand Cairo, where he seized prodigious treasures of every kind.

TA'MINY. *s.* A woollen stuff.

TA'MKIN. *s.* The stopple of the mouth of a great gun.

To TA'MPER. *v. a.* 1. To be busy with physic (*L'Estrange*). 2. To meddle; to have to do without fitness or necessity (*Roscom.*). 3. To deal; to practise secretly (*Hudibras*).

TAMUS. Black-bryony. In botany, a genus of the class diœcia, order pentandria. Calyx six-parted; corolless. Fem.: style three-cleft; berry inferior, three-celled; seeds two. Two species, as follow:

1. T. communis. Common black-bryony. Leaves heart-shaped, undivided: found wild in our own woods, with green flowers and red berries.

2. T. Creticus. Cretan black-bryony. Leaves three-lobed; a native of Crete; with green flowers as above. Both are cultivated from the seeds, and are useful in thickets and wilderness plantations.

TAMWORTH, a borough in Staffordshire, with a market on Saturday. It sends two members to parliament, and is seated on the Tame, eight miles S.E. of Lichfield, and 114 N.W. of London. Lon. 1. 38 W. Lat. 52. 49 W.

To TAN. *v. a.* (*tannen*, Dutch.) 1. To impregnate or imbue with bark (*Swift*). 2. To imbrown by the sun (*Cleaveland*).

TAN. TANNIN. (*tannen*, Germ.; a pine tree or larch.) The vegetable material, which when imbibed by hides or skins, thickens them in their structure, increases their weight, and renders them impervious to water. This material is obtained from various plants, and various parts of plants, more usually however from the bark, though sometimes, as in the case of the oak, from excrescences on the leaves, and at other times, as in the catechu, from a decoction of the wood. From the German name it should seem that the fir or larch was formerly employed for this purpose; though, from the superior quantity of tan belonging to other plants, these are never made use of in modern times. To the tan, when perfectly pure and freed from all admixture of extractive matter or other foreign substances, the French chemists have given the name of *tannin*, or the *tanning principle*.

This material is easily distinguished by its strong astringent taste, its peculiar smell, its forming immediately with a solution of gelatin or glue a whitish compound insoluble in water or alkohol; and by uniting to animal skin (which is for the most part gelatin in a condensed state): and whenever such skin is immersed in an infusion of it, rendering it harder, thicker, less pervious to water, and no longer susceptible of putrefaction.

Tan has never, perhaps, been obtained in the form of tannin, or perfectly pure, in a natural state; for all the parts of the vegetables that contain it give out on infusion a quantity of extract or extractive matter, sometimes mucilage, and often gallic acid, besides some saline substances: and as the chemical difference between some of these bodies appears but slight, and as all soluble vegetable matter possesses many properties in common, it is extremely difficult to obtain any one of them separate.

Deyeux was, perhaps, the first chemist who ascertained the peculiar nature of tan, or tanning. He pointed it out in his analysis of nutgalls, as a peculiar resinous substance, but without assigning it any name. Seguin soon after engaged in a set of experiments on the art of tanning leather; during which he discovered that tan has the property of precipitating glue from its solutions in water, and of combining with the skins of animals. This led him to suppose it the essential constituent of the liquids employed for the purpose of tanning leather. Hence the names tannin and tanning principle given it by the French chemists. But it is to Mr. Proust that we are indebted for the investigation of the nature and properties of tan, and of the methods of obtaining it in a separate state. Much curious and important information has likewise been obtained by the experiments of Davy on the constituent parts of astringent vegetables, and on their operation in tanning.

Tan exists in a great number of vegetable substances; but it may be procured most readily and in the greatest purity from nutgalls and catechu.

Nutgalls are excrescences formed on the leaves of the oak by the puncture of an insect which deposits its eggs on them. The best are known by the name of Aleppo galls, imported in large quantities in this country for the use of the dyers, calico-printers, &c. They are hard like wood, round, often nodulated on the surface, of an olive-green colour, and an excessively diagreeable taste. They are in a great measure soluble in water; what remains behind is tasteless, and possesses the properties of the fibre of wood. A very great proportion of water is necessary to carry off every thing soluble. Deyeux found that a French pound of nutgalls required 96 French pints of water, applied in 20 different portions one after the other, and allowed to macerate each a considerable time. This, reduced to our standard, gives us about 150 English pints to a pound troy of nutgalls.

From the analyses of Deyeux and Davy, it follows that the soluble part of nutgalls consists chiefly of five ingredients; namely, tan, extract, mucilage, gallic acid, and gallat of lime. Davy found that 500 grains of Aleppo galls formed with water a solution which yielded by slow evaporation 185 grains of matter. This matter he found composed of

130	tan
31	gallic acid and extract
12	mucilage and extract
12	lime and saline matter
185	

So that the tan constitutes rather more than two-thirds of the whole.

According to Mr. Davy, the strongest infusion of galls is of the specific gravity 1.068; and when evaporated at a temperature below 200°, yields a mass composed of $\frac{9}{10}$ tan, and $\frac{1}{12}$ gallic acid and extract. But at a boiling heat most of the gallic acid is dissipated or destroyed, and a portion of the extract is rendered insoluble in water.

Catechu, or terra japonica as it is also called, is a substance obtained by decoction and evaporation from a species of the mimosa which abounds in India. It has a reddish brown colour, and an astringent taste, leaving an impression of sweetness; it is not altered by exposure to the air. There are two varieties of it; one from Bombay, which has the lightest colour, and a specific gravity of 1.39; and one from Bengal, which is of the colour of chocolate; its specific gravity is 1.28. This substance was examined by Davy, and found to consist chiefly of tan combined with a peculiar species of extract.

Tan obtained from the infusion of nutgalls is a brittle substance, of a brown colour. It breaks with a vitreous fracture, and does not attract moisture from the air. Its taste is exceedingly astringent. It is very soluble in water. The solution is of a deep-brown colour, a very astringent and bitter taste, and has the odour which distinguishes a solution of nutgalls. It froths, when agitated, like a solution of soap; but does not feel unctuous. Tan is still more soluble in alcohol than in water. The solution has a deep-brown colour and an astringent taste.

When heated, it blackens, emits carbonic acid gass, and in the open air bursts, leaving always a small portion of lime.

From the experiments of Proust, Davy, and Deyeux, we learn, that it is capable of combining with oxygen; but at the same time it is either decomposed altogether, or its nature completely altered. Thus nitric acid converts it into a yellowish-brown matter soluble in alcohol, and similar in its properties to an extract. Oxymuriatic acid produces similar effects; and Mr. Proust has observed, that the peroxyd of tin changes it also into an extract, perhaps by communicating oxygen.

The action of the metals upon tan does not seem to be great; but almost all the metallic oxyds have an affinity for it, and are capable of combining with it; the compound is usually nearly insoluble in water. Hence the reason why the infusion of nutgalls precipitates metallic solutions so readily. These compounds have been hitherto in a great measure overlooked by chemists. The following observations contain the facts at present known.

When the peroxyd of tin or zinc is boiled in the infusion of galls, it acquires a dull yellow colour, and abstracts all the constituents from the infusion, leaving behind only pure water. The oxyds thus combined with tan, &c. are partly soluble in muriatic acid, and the solution indicates the presence of tan and gallic acid. When the peroxyd of tin is allowed to act upon the cold infusion, it abstracts all its constituents in a few days. But Mr. Proust affirms, that in that case the gallic acid is mostly destroyed, and a portion of the tan brought to the state of extract.

When the metallic salts are mixed with the infusion of galls, the precipitate consists of the metallic oxyd combined with the tan, the extract, and the acid of the infusion; and, according to Davy, it contains also a portion of the acid of the metallic salt.

Tan produces no change upon the solution of sulphat of iron; but when it is mixed with a solution of the oxysulphat of iron, a deep blue coloured precipitate immediately appears, consisting of the tan combined with the oxyd. This precipitate, when dried, assumes a black colour. It is decomposed by acids.

When too great a proportion of oxysulphat of iron is poured into a solution of tan, the sulphuric acid, set at liberty by the combination of the iron and tan, is sufficient to redissolve the precipitate as it appears; but the precipitate may easily be obtained by cautiously saturating this excess of acid with potass. When the experiment is performed in this manner, all the oxysulphat of iron which remains in the solution undecomposed is converted into sulphat. Mr. Proust supposes that this change is produced by the tan absorbing oxygen from the iron. The same change takes place if oxyd is mixed with a considerable excess of sulphuric acid, and diluted with water. Common writing-ink is a combination of gallat of iron and tannat of iron.

The alkalies combine readily with tan, and form with it a compound soluble in water. This was first observed by Deyeux, whose experiments have been verified by Davy. When potass or soda is added to the infusion of nutgalls, the liquid assumes a reddish brown colour, and loses the property of precipitating gelatine, till alkali is saturated with an acid. When the alkalized infusion is evaporated to dryness, an olive-coloured mass remains of a faint alkaline taste, which deliquesces in the air. Ammonia produces the same effect upon the infusion of galls; but when the mixture is exposed to the heat of boiling water, part of the ammonia flies off, a precipitate falls, consisting of most of the tan and gallic acid, while the extract remains in solution.

All the earths hitherto tried have a strong affinity for tan, and form with it compounds for the most part insoluble in water, the properties of which have scarcely been examined by chemists.

One of the most important properties of tan is the insoluble compound which it forms with glue or gelatine, as this substance is termed by chemists. It is therefore employed to detect the presence of gelatine in animal fluids; and, on the other hand, solutions of gelatine are employed to detect the presence of tan in vegetable fluids, and to ascertain its quantity. Now, although the compound of gelatine and tan is insoluble in water, it is soluble both in the solution of tan and of gelatine when sufficiently diluted. It is necessary, therefore, that the solution of gelatine, used to detect tan, should be as concentrated as is consistent with its perfect fluidity; for glue, when gelatinous, does not act upon tan. It is necessary also that it should be employed quite fresh; for when in a state of putrefaction, it loses its property of precipitating tan. Davy has ascertained that the best proportion for use is a solution of 120 grains of isinglass in 20 ounces of water. Care must be taken not to add an excess of the solution to the liquid from which the tan is to be separated; because the compound of tan and gelatine is re-dissolved by the solution of gelatine. According to the analysis of Davy, this compound, when dried in the temperature of 150°, is composed of

54 gelatin
46 tan
———
100

It appears, from the experiments of Sir H. Davy and Mr. Chenevix, that tan is sometimes formed in vegetables by the action of heat. Thus no tan can be detected in the decoction of coffee-beans, unless they have been roasted; but in that case their decoction precipitates gelatine.

From the experiments of Davy, we learn that the affinities of the different classes of bodies capable of combining with tan are nearly in the following order:

Earths,
Alkalies,
Gelatine,
Acids,
Neutral salts.

But the order of the individual substances belonging to each of these classes remains still to be ascertained.

Tan affects particularly the bark of trees; but it exists also in the sap and in the wood of a considerable number, and even in the leaves of many. It is very seldom that it exudes spontaneously; yet this seems to be the case with a variety of kino.

It has been ascertained by Mr. Biggin, that when the barks of trees are examined at different seasons, they vary in the quantity of tan. The quantity varies also with the age and size of the trees. The greatest proportion of tan is contained in the inner barks. The epidermis usually contains none.

The following table exhibits the proportion of solid matter extracted by water from different vegetable substances, and the quantity of tan contained in that solid matter, as ascertained by the experiments of Sir H. Davy.

One Ounce of	Solid Matter. *Grains.*	Tan. *Grains.*
White inner bark of old oak	108	72
——— young oak	111	77
——— Spanish chesnut - - - - - -	89	63

One ounce of	Solid Matter. *Grains.*	Tan. *Grains.*
White inner bark of Leicester willow	117	72
Coloured or middle bark of oak	43	19
———— Spanish chesnut	41	14
———— Leicester willow	34	16
Entire bark of oak	61	29
Entire bark of Spanish chesnut	53	21
———— Leicester willow	71	33
———— elm	—	13
———— common willow	—	11
Sicilian sumach	165	78
Malaga sumach	156	79
Souchong tea	—	48
Green tea	—	41
Bombay catechu	—	261
Bengal catechu	—	231
Nutgalls	180	127

TAN (Artificial). Mr. Hatchet has lately detected a very curious production of tannin by artificial means from substances which do not naturally possess a particle of it. He was led to the discovery by pursuing his former experiments on bitumens and Bovey coal, and particularly on their habitudes with nitric acid. When a pure resin of any kind is digested with this acid, it is converted into an orange-coloured viscid substance, which at first separates; but by a farther effusion of acid is rendered soluble in water and alkohol. On the other hand, when a bitumen is treated in this manner the first effort of the acid is to separate this orange-yellow substance, and at the same time to produce a very dark brown solution. Now it has been very sufficiently proved that bitumens consist of a resin holding a portion of uncombined carbon; and hence Mr. Hatchet conceived that a separation of these two substances was effected by the acid; and that the brown solution contained only the uncombined carbon dissolved in nitric acid, whilst the orange-coloured mass was furnished by the resin. This was confirmed by treating in the same way amber, asphalt, different species of pit-coal, and lastly, pure charcoal, all of which yielded the brown solution in abundance, particularly the charcoal, but only those substances that contained bitumen deposited any of the orange-coloured mass. The charcoal therefore yielded none of this latter, but dissolved completely in the acid, making a dark reddish-brown liquid. This liquid was slowly evaporated to dryness, and left a brown glossy substance, with a resinous fracture, the properties of which are the following.

1. It is speedily dissolved by cold water and by alkohol.

2. Its taste is highly astringent.

3. Exposed to heat it smokes but little, swells much, and affords a bulky coal.

4. The watery solution reddens litmus paper.

5. The same solution copiously decomposes the metallic salts, especially muriat of tin, acetite of lead, and red sulphat of iron, forming brown or chocolate-coloured precipitates.

6. It precipitates gold from its solution in the metallic state.

7. It also precipitates the earthy salts.

8. The fixed alkalies at first only deepen the colour of the solution, but after a time render it turbid.

9. Glue or isinglass dissolved in water and added to the above solution forms an immediate precipitate more or less brown according to the degree of concentration, which is insoluble in water whether cold or boiling, and appears closely to resemble the precipitate formed by adding gelatine to the infusion of galls or other vegetable astringents.

From these facts it appears that whenever carbon, either as simple charcoal or in natural mixture with resins in the form of bitumen or coal, is digested in nitric acid, it is speedily dissolved therein, and is then converted into a substance closely resembling natural tannin, from which most of the excess of acid may be separated by cautious drying and resolution in water.

It chiefly differs from natural tannin in its being soluble in alkohol; and hence it can never be washed in this fluid, like natural tannin, to separate its gallic acid, since both are equally dissolved in the artificial kind, and only the gallic acid in the natural.

Sulphuric acid may be employed instead of nitric; but the tannin will then be found much weaker in energy.

There is, however, another important difference between natural and artificial tannin; which is, that the former has its distinguishing properties, particularly that of precipitating gelatin, entirely destroyed by digestion with nitric acid; while the artificial kind is made by means of this acid, and resists all further change by it, in any temperature, at least for a considerable length of time.

From all these original and truly valuable experiments, therefore, it appears that artificial tannin may be made in the following ways.

1. By simply dissolving in nitric acid either pure charcoal, vegetable or animal, or vegetable compounds that contain naturally any quantity of uncombined charcoal, or in which charcoal has been produced by previous exposure to heat or by sulphuric acid. In these the quantity of tannin is directly proportioned to that of the charcoal alone.

2. By repeatedly abstracting nitric acid off most of the resins, and some other vegetable inflammables, which is totally independent of any uncombined charcoal that they may contain.

3. By long digestion of resins, oils, and some other substances with sulphuric acid, stopping the process before the ultimate effect of the acid is produced, and extracting the tannin from the half-charred mass by alkohol.

Further experiments, however, are required to ascertain all the differences there may be between these varieties of artificial tannin, and between these and natural tannin.

TANACETUM. Tansy. In botany, a genus

of the class syngenesia, order polygamia æqualis. Receptacle naked; seeds crowned with a slight margin; calyx imbricate, hemispherical; florets of the ray obsolete, or three-cleft; sometimes wanting. Eighteen species; chiefly natives of the Cape, the rest of Europe or the Levant: one common to our own wastes. The following are cultivated.

1. T. vulgare. Common tansy. Leaves doubly pinnatifid, deeply serrate; root fibrous, creeping, spreading to a great distance; flowers in terminal corymbs, of a gold colour, and flattish. The leaves and flowers have a strong, not very disagreeable smell, and a bitter, somewhat aromatic taste. The virtues of tansy are tonic, stomachic, anthelmintic, emmenagogue, and resolvent. It has been much used as a vermifuge; and testimonies of its efficacy are given by many respectable physicians.

2. T. annuum. Annual tansy.

3. T. balsamita. Costmary: formerly employed as a carminative in medicine under the name of BALSAMITA MAS, which see.

4. T. Sibericum. Siberian tansy.

5. T. suffruticosum. Shrubby tansy.

6. T. flabelliforme. Fan-leaved tansy. The herbaceous kinds are increased by seeds and by parting the roots; the shrubby sorts by cuttings of the branches in spring and summer.

TANÆCIUM, in botany, a genus of the class didynamia, order angiospermia. Calyx cylindrical, truncate; corol tubular, nearly equal, five-cleft; rudiment of a fifth filament; berry very large, covered with a bark. Three species; two, natives of Jamaica, climbing plants; one of Mozambique, a vast tree, with fruit the size of a man's head.

TANAGER. See TANAGRA.

TANAGRA. Tanager. In zoology, a genus of the class aves, order passeres. Bill conic, pointed, notched, almost triangular at the base, a little inclining at the tip. Forty-eight species; all of foreign extraction, and nearly all belonging to the West Indies and America. Buffon, indeed, confines the whole tribe to South America; nor will such a multiplicity of distinct species of the same genus in one country appear surprising when we recollect that, in these warm climates, where the food is abundant, the forests larger, and the lands more thinly peopled, birds are ten times more numerous than with us, where one severe winter almost exterminates whole tribes, both of land and water fowls. The tanagers, in South America, may be regarded as the representatives of the sparrow of Europe; a genus which they resemble in almost every particular, excepting the colour, and the small groves hollowed out of the sides of the upper mandible towards the point. Like the sparrows, they make short and heavy flights; like them, too, they are granivorous: both cultivate the same familiarity with man; both are dependent on his labours, and are destructive of his property. They are sociable with regard to each other, as well as to man; for they assemble in flocks upon the dry and open fields, around the villages. The tanagers, however, lay only two eggs at a brood, while our sparrows lay five; a circumstance pretty frequent among birds of warm countries, whose apparent infecundity is so amply compensated by the frequency of their breeding. In the mild and equal temperature of these climates, every season is a season of love, and every brood is quickly produced, and as quickly succeeded by another. The following will serve sufficiently as specimens:

1. T. jacapa. Red-breasted tanager. Black; front, throat, and breast scarlet. Female: purplish-brown, beneath reddish; wings and tail brown. Inhabits South America; six and a half inches long; frequents inhabited places, and builds a pendulous, cylindrical, and somewhat curved nest; feeds on fruit; eggs white, with small reddish spots.

2. T. violacea. Golden tanager. Violet; beneath, and hind-head fine yellow; middle-quill and lateral tail-feathers within white. Another variety, black instead of violet. Fem.: above olive; young bird blue and olive. Inhabits Brasil and Cayenne; three and a half inches long; is very destructive to rice-plantations. Variable in its colours.

3. T. Mexicana. Black and blue tanager. Black, beneath yellowish; breast and rump blue. Another variety, with tail-coverts green, the body beneath white. Inhabits South America: five inches long; sings very finely.

TANDA, or TANRAH, a town of Hindustan Proper, in Bengal, of which soubah it was the capital in the 17th century. There is little remaining of it but the rampart; and the period when it was deserted is not certainly known. It is seated on the Ganges, 120 miles N.W. of Dacca. Lon. 87. 56 E. Lat. 23. 25 N.

TANG. *s.* (*tanghe*, Dutch, acrid.) 1. A strong taste; a taste left in the mouth (*Locke*). 2. Relish; taste (*Atterbury*). 3. Something that leaves a sting or pain behind it (*Shaksp.*). 4 Sound; tone (*Holder*).

To TANG. *v. n.* To ring with (*Shakspeare*).

TANGENCIES (Problem of). This general problem in geometry furnishes the subject of one of the twelve treatises described by Pappus in the preface to the 7th book of his Mathematical Collections. In Dr. Halley's translation of Pappus the problem is thus enumerated: "E punctis rectis et circulis, quibuscunque tribus positione datis, circulum ducere per singula datæ puncta, qui, si fieri possit, contingat etium datas lineas." This is naturally subdivided into ten distinct propositions, which, if a point be represented by (.), a line by (I), and a circle by (o), may be stated very briefly according to the several data, in the following order:—(..I), (.II), (IIo), (.Io), (Ioo), (..o), (.oo), (ooo), (...), (III).

The treatise on tangencies was restored by Vieta, under the title of Apollonius Gallus, and many of his deficiencies were supplied by Marinus Ghetaldus. These have been translated with the addition of a supplement by Mr. Lawson, and a farther addition of Fermat's Treatise on Spherical Tangencies.—Mr. Leslie has given in his Geometry, solutions to all except the 5th, 7th, and 8th, of the preceding enumeration; but they are inelegant and defective.

TANGENT, in geometry, a right line

which touches a circle; that is, meets it in such manner, as that though infinitely produced, it would never cut the same; that is, never come within the circumference.

It is demonstrated in geometry; 1. That if a tangent and a secant be both drawn from the same point, the square of the tangent will be equal to the rectangle, under the whole secant, and that portion thereof which falls without the circle.

2. That if two tangents be drawn to the same circle from the same point, they will be equal to each other.

As a right line is the tangent of a circle, when it touches the circle so closely that no right line can be drawn through the point of contact between it and the arc, or within the angle of contact that is formed by them; so, in general, when any right line touches any arc of a curve, in such a manner that no right line can be drawn through the point of contact, betwixt the right line and the arc, or within the angle of contact that is formed by them, then is that line the tangent of the curve at the said point.

The tangent of an arc is the right line that limits the position of all the secants that can pass through the point of contact, though strictly speaking, it is no secant.

In the ellipse and hyperbola, the semiaxis is a mean proportional between the distance from the foot of the ordinate let fall from the point of contact, and the distance from the centre to the point where the tangent cut the axis produced. In the parabola, the distance from the vertex to the foot of the ordinate is equal to the distance from the vertex to the point where the tangent cuts the axis produced.

Tangent, in trigonometry.—*A tangent of an arc*, or of the angle measured by that arc, is a right line, raised perpendicularly on the extreme of the diameter, and continued to a point, where it is cut by a secant, that is, by a line, drawn from the centre through the extremity of the arc whereof it is a tangent.

Co-tangent, or tangent of the complement, is the tangent of an arc which is the complement of another arc to a quadrant.

The tangent of an arc is a 4th proportional to the cosine, sine, and radius.

If A denote any arc, then we have $A = \text{tan.}\,A - \frac{1}{3}\,\text{tan.}\,{}^3A + \frac{1}{5}\,\text{tan.}\,{}^5A - \frac{1}{7}\,\text{tan.}\,{}^7A + \&c.$ Whence since tan. 45° = 1, we have arc 45° $= 1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} - \frac{1}{11} + \&c.$ And, conversely,

$$\text{tan.}\,A = A + \frac{A^3}{3R^2} + \frac{2A^5}{15R^4} + \frac{17A^7}{315R^6} + \frac{62A^9}{2835R^8} + \frac{1382A^{11}}{155925R^{10}} + \&c.,$$

where R denotes the radius of the circle of which A is the arc.

Further, we have

$$\text{tan.}\,A = \frac{\text{sin.}\,A}{\text{cos.}\,A} = \frac{1}{\text{cot.}\,A} = \sqrt{\left(\frac{1}{\text{cos.}\,{}^2A} - 1\right)} = \frac{\text{sin.}\,A}{\sqrt{(1 - \text{sin.}\,{}^2A)}} = \frac{\sqrt{(1 - \text{cos.}\,{}^2A)}}{\text{cos.}\,A} = \frac{2\,\text{tan.}\,\frac{1}{2}A}{1 - \text{tan.}\,{}^2\frac{1}{2}A} = \frac{2}{\text{cot.}\,\frac{1}{2}A - \text{tan.}\,\frac{1}{2}A} = \text{cot.}\,A - 2\,\text{cot.}\,2A = \frac{1 - \text{cos.}\,2A}{\text{sin.}\,2A} = \frac{\text{sin.}\,2A}{1 + \text{cos.}\,2A} = \sqrt{\frac{1 - \text{cos.}\,2A}{1 + \text{cos.}\,2A}} = \frac{\text{tan.}\,(45 + \frac{1}{2}A) - \text{tan.}\,(45 - \frac{1}{2}A)}{2}.$$

Also,

$$\text{tan.}\,(A + B) = \frac{\text{tan.}\,A + \text{tan.}\,B}{1 - \text{tan.}\,A\,\text{tan.}\,B}.$$

$$\text{tan.}\,(A - B) = \frac{\text{tan.}\,A - \text{tan.}\,B}{1 + \text{tan.}\,A\,\text{tan.}\,B}.$$

$$\text{tan.}\,A + \text{tan.}\,B = \frac{\text{sin.}\,(A + B)}{\text{cos.}\,A\,\text{cos.}\,B}.$$

$$\text{cot.}\,A + \text{cot.}\,B = \frac{\text{sin.}\,(A + B)}{\text{sin.}\,A\,\text{sin.}\,B}.$$

See the treatises on trigonometry by Emerson, Cagnoli, Mauduitt, Bonnycastle, Woodhouse, &c. See also our article Trigonometry.

Artificial tangents, or *logarithmic tangents*, are the logarithms of the tangents of arcs; so called, in contradistinction from the natural tangents, or the tangents expressed by the natural numbers.

Line of tangents, is a line usually placed on the sector, and Gunter's scale; the description and uses of which see under the article Sector.

Sub-tangent, a line lying beneath the tangent, being the part of the axis intercepted by the tangent and the ordinate to the point of contact.

Method of tangents, is a method of determining the quantity of the tangent and subtangent of any algebraic curve; the equation of the curve being given.

This method is one of the great results of the doctrine of fluxions. It is of great use in geometry; because that in determining the tangents of curves, we determine at the same time the quadrature of the curvilinear spaces: on which account it deserves to be here particularly treated on.

To draw the tangent, or to find the sub-tangent, of a curve.—If AE be any curve, and E any point in it, to which it is required to draw a tangent TE, Draw the ordinate DE, (fig. 4, pl. 167.) then if we can determine the subtangent TD, by joining the points T and E, the line TE will be the tangent sought.

Let *dae* be another ordinate indefinitely near to DE, meeting the curve, or tangent produced, in *e*; and let E*a* be parallel to the axis AD. Then is the elementary triangle E*ae* similar to the triangle TDE;

and therefore . *ea* : *a*E : : ED : DT;
but.......... *ea* ; *e*E : : flux. ED ; flux. AD;
therefore..... flux. ED : flux. AD : : DE : DT;
that is......... $\dot{y} : \dot{x} :: y : \frac{y\dot{x}}{\dot{y}} = \text{DT}$,

which is therefore the value of the subtangent sought; where x is the absciss AD, and y the ordinate DE.

Hence we have this general rule: by means of the given equation of the curve, find the value either of $\dot{x}$ of $\dot{y}$, or of $\frac{\dot{x}}{\dot{y}}$, which value substitute for it in the expression $\text{DT} = \frac{y\dot{x}}{\dot{y}}$, and when reduced to its simplest terms, it will be the value of the subtangent sought. This we may illustrate in the following examples.

Ex. 1. The equation defining a circle is $2ax - xx = y^2$, where a is the radius; and the fluxion of this is $2a\dot{x} - 2x\dot{x} = 2y\dot{y}$; hence $\frac{\dot{x}}{\dot{y}} = \frac{y}{a - x}$; this multiplied by y, gives $\frac{y\dot{x}}{\dot{y}} = \frac{y^2}{a - x} = \frac{\text{DE}^2}{\text{CD}} =$ the subtangent TD, or CD : DE :: DE : TD, which is a property of the circle we also know from common geometry, *Ex.* 2. The equation defining the common parabola is $ax=y^2$, a being the parameter, and x and y the absciss and ordinate in all cases. The fluxion of this is $a\dot{x} = 2y\dot{y}$; hence $\frac{\dot{x}}{\dot{y}} = \frac{2y}{a}$; conseq. $\frac{y\dot{x}}{\dot{y}} = \frac{2y^2}{a} = \frac{2ax}{a} = 2x = \text{TD}$; that is, the subtangent TD is double the absciss AD, or TA is = AD, which is a well-known property of the parabola.

Ex. 3. The equation defining an ellipsis is $c^2.\overline{2ax - x^2} = a^2y^2$, where a and c are the semi-axes. The fluxion of it is $c^2.\overline{2a\dot{x} - 2x\dot{x}} = 2a^2y\dot{y}$; hence $\frac{y\dot{x}}{\dot{y}} = \frac{a^2y^2}{c^2(a-x)} = \frac{c^2(2ax - x^2)}{c^2(a-x)} = \frac{2a - x}{a - x}x = \text{TD}$ the subtangent; or by adding CD which is $= a - x$, it becomes $\text{CT} = \frac{2ax - x^2}{a - x} + a - x = \frac{a^2}{a-x} = \frac{\text{CA}^2}{\text{CD}}$, or CD : CA :: CA : CT, a well-known property of the ellipse.

Ex. 4. The equation defining the hyperbola is $c^2.\overline{2ax + x^2} = a^2y^2$, which is similar to that for the ellipse, having only $+ x^2$ for $- x^2$; hence the conclusion is exactly similar also, viz. $\frac{2a + x}{a + x}x$ or $\frac{2ax + xx}{a + x} = \text{TD}$, which taken from CD or $a + x$, gives $\text{CT} = \frac{\text{CA}^2}{\text{CD}}$, or CD : CA :: CA : CT.

The preceding examples relate to curves whose ordinates are parallel to each other. We shall now briefly illustrate the method of drawing tangents to curves of the spiral kind, all whose ordinates issue from a point: such as the spiral BAG (fig. 5.) whose ordinates CB, CA, CG, are referred to the point C, called the centre of the spiral. Let SAN be a tangent to the spiral at any point A, and let CT be perpendicular to it, and let the arc CBA (considered as variable by the motion of A towards G) be denoted by z, and the ordinate CA by y. Then $\dot{z} : \dot{y} :: \text{AC}\,(y) : \text{AT} = \frac{y\dot{y}}{\dot{z}}$. Hence, if upon CA, as a diameter, a semicircle be described, and in it, from A, a right line equal to $\frac{y\dot{y}}{\dot{z}}$ be inscribed, that right line will be a tangent to the spiral at the point A.

5. Let the nature of the curve CBA be such, that the arc CBA may be, always, to its corresponding ordinate CA in a constant ratio, viz. as a to b: then, because $z : y :: a : b$, we have $z = \frac{ay}{b}$, and $\dot{z} = \frac{a\dot{y}}{b}$; and, consequently, $\text{AT}\left(\frac{y\dot{y}}{\dot{z}}\right) = \frac{by}{a} = \frac{b}{a} \times \text{AC}$: therefore, AC and AT being in a constant ratio, the angle CAT must also be invariable; which is a known property of the logarithmic spiral.

6. Let BAA (fig. 6.) be the spiral of Archimedes; whose nature is such, that the part EA of the generating ordinate, intercepted by the spiral, and a circle BED described about the same centre C, is always in a constant ratio to the corresponding arc BE of that circle. Suppose An perpendicular to AC; BC $= c$, CA $= y$, and the given ratio of AE to BE that of b to c; then $b : c :: y - c\,(\text{AE}) : \frac{cy - cc}{b} = \text{BE}$; whose fluxion is $= \frac{c\dot{y}}{b}$. If the right line CEAa be supposed to revolve about the centre C, the angular celerity of the generating point A, in the perpendicular direction An, will be to that of E as AC to EC; and as the latter of these celerities is expressed by $\frac{c\dot{y}}{b}$, the former will be expressed by $\frac{y}{c} \times \frac{c\dot{y}}{b}$, or $\frac{y\dot{y}}{b}$ which is to $\dot{y}$, the celerity of A in the direction Aa, as $\frac{y}{b}$ to unity, or as y to b. Consequently CT and AT are in the same ratio, and $\text{AC} : \text{CT} :: \sqrt{yy + bb} : y$; and $\text{AC} : \text{AT} :: \sqrt{yy + bb} : b$; whence CT and AT, are given, equal to $\frac{y^2}{\sqrt{yy + bb}}$, and $\frac{by}{\sqrt{yy + bb}}$ respectively; from either of which expressions the tangent AT may be drawn: and, in the same manner, may the position of the tangent of any other spiral be determined.

In the business of finding tangents by fluxions there is an interesting case arises when the expression for the subtangent becomes $\frac{0}{0}$. It is not to be concluded from this circumstance that the sub-tangent itself vanishes. The ratio represented by $\frac{\dot{x}}{\dot{y}} = \frac{0}{0}$ ought to arise in those points wherein two or more branches of a curve intersect each other. The difficulty is removed by the method of multiplying by arithmetical progressions, and by other processes; for a description of which, see Agnesi's Analytical Institutions, vol. ii. p. 50—56; and Bossut Traite de Calcul Differentiel, &c. tom. i. p. 167—174. The latter author applies this case of tangents very ingeniously to the theory and processes respecting vanishing fractions.

The inverse method of tangents.—This is the reverse of the foregoing, and consists in finding the nature of the curve that has a given subtangent. The method of solution is to put the given subtangent equal to the general expression $\frac{y\dot{x}}{\dot{y}}$, which serves for all sorts of curves; then the equation reduced, and the fluents taken, will give the fluential equation of the curve sought.

Ex. 1. To find the curve line whose subtangent is $= \frac{2y^2}{a}$. Here $\frac{2y^2}{a} = \frac{y\dot{x}}{\dot{y}}$; hence $2y\dot{y} = a\dot{x}$, and the fluents of this give $y^2 = ax$, the equation to a parabola, which therefore is the curve sought.

Ex. 2. To find the curve whose subtangent is $= \frac{yy}{2a - x}$, or a third proportional to $2a - x$ and y. Here $\frac{yy}{2a-x} = \frac{y\dot{x}}{\dot{y}}$; hence $y\dot{y} = 2a\dot{x} - x\dot{x}$, the fluents of which give $y^2 = ax - x^2$, the equation to a circle, which therefore is the curve sought.

For more on this useful branch of analytics, the reader is referred to the Treatises on Fluxions by Maclaurin, Simpson, Emerson, and Dealtry, and those on the differential calculus by Bossut, Lacroix, Lagrange, &c.

TANGIBI'LITY. *s.* (from *tangible.*) The quality of being perceived by the touch.

TA'NGIBLE. *a.* (from *tango*, Lat.) Perceptible by the touch (*Locke*).

TANGERMUNDE, a town of Germany, in the old marche of Brandenburg, with a castle, seated on the Tanger, where it falls into the Elbe, 24 miles N.W. of Brandenburg, and 28 N.E. of Magdeburg. Lon. 13. 30 E. Lat. 52. 46 N.

TANGIER, a seaport of the kingdom of Fez. It was taken by the Portuguese, in 1471, and given as a dower to the princess Catharine, on her marriage with Charles II. of England; but he did not think it worth the expence of keeping, and therefore, in 1683, caused the works to be blown up, and withdrew the garrison. It is 130 miles N. of Fez. Lon. 5. 50 W. Lat. 35. 49 N.

To **TA'NGLE.** *v. a.* (See Entangle.) 1. To implicate; to knit together. 2. To ensnare; to entrap (*Milton*). 3. To embroil; to embarrass (*Crashaw*).

To Ta'ngle. *v. n.* To be entangled.

Ta'ngle. *s.* (from the verb.) A knot of things interwoven in one another (*Milton*).

TANJORE, a province of Hindustan, on the coast of Coromandel. It is an appendage of the Carnatic, but subject to its own rajah, who pays an annual subsidy to the English East India Company.

Tanjore, a city of Hindustan, in the Carnatic, capital of a province of the same name. It is seated on the Cauvery, 156 miles S. by W. of Madras, and 166 S.E. of Seringapatam. Lon. 79. 12 E. Lat. 10. 46 N.

TA'NISTRY. *s.* The Irish hold their lands by *tanistry*, which is no more than a personal estate for his lifetime that is *tanist*, by reason he is admitted thereunto by election (*Spenser*).

TANK. *s.* (*tanque*, Fr.) A large cistern or basin (*Dryden*).

TA'NKARD. *s.* (*tankaerd*, Dutch.) A large vessel with a cover, for strong drink (*Arbuthnot*).

TANNA, a fertile island in the Pacific Ocean, one of the New Hebrides, on which is a volcano. The inhabitants are brave and hospitable; and their arms are bows and arrows, slings, spears, and clubs. Lon. 169. 46 E. Lat. 19. 30 S.

TA'NNER. *s.* (from *tan.*) One whose trade is to tan leather (*Moxon*).

Tanner (Thomas), a learned English prelate, was born at Market Lavington, in Wiltshire, in 1674. He received his academical education in Queen's college, Oxford, where he took his degree of B. A. In 1695 he was elected fellow of All-saints, and after passing through various church preferments, was consecrated bishop of St. Asaph, in 1732. He died in 1735, and was buried in the cathedral of Christ-church, Oxford. Bishop Tanner is known by an excellent work, entitled Noticia Monastica; or, an Account of all the Religious Houses in England and Wales, folio, 1744. In 1741 appeared his Bibliotheca Britannico Hibernica.

TANNIN. See Tan.

TANNING, the process of preparing hides and skins by means of tan, so as to give them the full benefit of its effects; becoming harder, thicker, heavier, more impervious to water, and capable of resisting putrefaction. Hides and skins thus prepared are called Leather; and to this article we refer our readers for the process of tanning.

TANSY, in botany. See Tanacetum.

Tansy (Wild). See Potentilla.

TANTALIUM, in mineralogy, a genus of the class metals. Blackish-grey, softish, of a granular fracture, not magnetic; specific gravity 6.500: not soluble in any acid, nor altering its colour when heated to redness; melting with phosphat of soda and borax into a colourless glass. Two species.

1. T. manganesiatum. Tantalite. Found at Kimito in Finland, in irregular crystals; colour between blueish-grey and blackish-grey; surface smooth with metallic lustre; very hard; fracture compact.

2. T. ytriatum. Yttrotantalite. Consisting of oxyd of tantalium, combined with oxyds of iron and yttria. Found, also, at Kimito in Finland, in small kidney-form masses of inconsiderable hardness; fracture granular, iron-grey, of metallic lustre; may be scratched with a knife, and gives a grey powder.

To **TA'NTALIZE.** *v. a.* (from *Tantalus*, whose punishment was to starve among fruits and water which he could not touch.) To torment by the show of pleasures which cannot be reached (*Addison*).

TANTALUS, a king of Lydia, son of Jupiter, by a nymph called Pluto. He was father of Niobe, Pelops, &c. by Dione, one of the Atlantides. He is represented by the poets as punished in hell, with an insatiable thirst, and placed up to the chin in the midst of a pool of water, which flows away as soon as he attempts to taste it. There hangs also above his head a bough, richly loaded with delicious fruit, which, as soon as he attempts to seize, is carried away from his reach by a sudden blast of wind. He is thus punished either for theft, cruelty, and impiety, or lasciviousness, for the causes are variously explained.

Tantalus. Ibis. In zoology, a genus of the class aves, order grallæ. Bill long, subulate, rounded, subarched; face naked; tongue short, broad; jugular pouch naked; nostrils oval; feet four-toed, palmate at the base. Twenty-three species, scattered over the warmer climates of the globe. The following are chiefly worthy of notice.

1. T. ibis. Egyptian ibis. Face red; bill pale yellow; quill-feathers black; body whitish-rufous. From thirty to forty inches long: inhabits in vast numbers the lower parts of Egypt.

This bird, so faithful in the service of its native country, was made the emblem of it. Its figure, which we find wrought on all the ancient Egyptian monuments, represents Egypt; where divine honours were paid to it by the superstitious inhabitants. The intention of the legislator in consecrating this bird was, no doubt, to preserve and to multiply animals that destroyed the noxious reptiles with which Egypt abounds. Even after it is satiated, the ibis is continually occupied, on the banks of the Nile, in destroying locusts, caterpillars, and serpents. But however useful the ibis may be, some have doubted whether this bird be the same with that which had divine honours paid to it by the ancients. Storks, kites, and vultures, are all hostile to serpents; and the figure, marked in their hieroglyphics, is not sufficiently distinct, to determine exactly for what species of the serpentivorous birds it was intended.

The consecration of brute animals, which at first sight appears so monstrous and degrading to human reason, was, however, in the early periods of the Egyptians, attended with circumstances that favoured its establishment, and in some measure palliated its absurdity. The early stages of society in that country were periods of misery. The noisome and destructive tribes, with which those wretched savages were surrounded, were too numerous, and too powerful, to be repelled by men, in a rude, solitary, and defenceless state, who had neither arms, nor any of those arts that are necessary to render human strength of avail against the animal creation. There cannot be a stronger proof of the wretched imbecility of man in his first stage of social union than his being obliged to humble himself, even to adoration, before the brutes. Those numerous tribes, that we afterwards behold his slaves, were originally his masters, or, at least, his formidable rivals for dominion. Fear and hope are the great pillars upon which superstition builds those monuments of weakness and ignorance, which are deemed so mortifying to pride, and disgraceful to reason. By uniting these together, she has made deities of almost every animal, either useful or destructive.

In Egypt, accordingly, the worship of animals was early established, and rigidly adhered to, for a long succession of ages. This the ancient monuments fully evince; and seem to be a proof of the painful struggles between man and the noxious animals around him, before his dominion over them was established. That country, indeed, seems peculiarly favourable to the growth of serpents, crocodiles, locusts, and every species of impure animals. Among the vast masses of fat mud with which that flat and fertile district is constantly covered, by the overflowings of the Nile, such animals teem with fecundity, and almost cover the surface of the earth. The numberless myriads of noxious animals which are thus generated under the invigorating influence of a vertical sun acquire also a size, that renders them truly formidable to man; as well as to the nobler animals, to which, however, they are at last obliged to yield.

In this manner was the worship of animals established in Egypt, and, probably, in every country in which it has prevailed; and, in the general veneration that was paid to certain animals by the Egyptians, the ibis came in for a share, proportioned to the services it rendered them in destroying these armies of reptiles.

In the progress of knowledge and the arts, reason might have checked this extravagance, had not the priests and legislators encouraged it, to give greater sanction to those laws, that were made for the preservation of this useful bird. Such is the weakness of the human mind, that, in all ages, wise legislators have found it necessary to call in the aids of superstition to strengthen their laws. In Egypt they alleged, that the ibis was a favourite of heaven; and that, if ever the gods should deign to manifest themselves to man, it would certainly be in the shape of that animal: and that in the great metamorphosis of the gods, Mercury, the inventor of laws and arts, and the tutelar deity of Egypt, had already undergone this transformation.

Herodotus informs us, that he went to be an eye witness of the labours of the stork; and that, near Butus, on the confines of Arabia, where the mountains open to the vast plains of Egypt, he saw the fields covered with an incredible quantity of the bones and fragments of serpents, that had been devoured by this bird. Cicero and Pliny confirm this account.

In return for these services, the Egyptians ordained, that the killing of the ibis should be held a capital crime; and, being skilled in embalming, that gloomy art of perpetuating the images of death, they rewarded, as they imagined, the good offices of the ibis, by preserving its carcase after its decease. In the plain of Saccara, there are several pits, in which the dried skeletons of birds are found preserved, as mummies; and, among others, have most generally been recognised those of the ibises. Buffon had several of the vessels, in which these skeletons were contained, sent to him for his inspection.

2. T. loculator. Wood ibis. Face blueish; bill reddish; legs, quill, and tail-feathers black; body white. Two other varieties; in one the head and neck diversified with yellow; in the other, the wing-coverts white. Inhabits New Holland and the warmer parts of America; three-feet long; is very slow in flight and stupid; sits on trees, and feeds on herbs, seeds, fruits, fishes, and reptiles: the flesh good. Bill nine inches long; irids reddish.

3. T. leucocephalus. White-headed ibis. Head, neck, and body white; bill and face yellow; legs pale flesh colour; rump with long rosy feathers. Inhabits India; the largest of its tribe; every year before the rainy season sheds its rosy feathers.

4. T. ruber. Scarlet ibis. Face, bill, and legs red; body scarlet; wings tipt with black. Inhabits South America; twenty-one inches long; sits on trees, but lays its greenish eggs on the ground. The young are at first black, then grey, just before they fly whitish, and afterwards grow gradually red.

5. T. igneus. Glossy ibis. Head and neck black; legs green; body varied with glossy-

blue, blackish, green and claret, beneath dark rufous; quill and tail-feathers green-gold. Inhabits Russia; thirteen inches long: was once shot in Cornwall. Bill green. See Nat. Hist. Pl. CLXVIII.

Tantalus's cup, in hydraulics, a siphon so adapted to a cup, that the short leg being in the cup, the long leg may go down through the bottom of it.

The bended siphon is called Tantalus's cup, from the resemblance of the experiment made with an image in the glass, representing Tantalus in the fable, fixed up in the middle of the cup with a siphon concealed in his body, beginning in the bottom of his feet, and ascending to the upper part of his breast; there it makes a turn, and descends through the other leg, on which he stands; and from thence down through the bottom of the cup, where it runs out, and causes the water to subside in the cup; as soon as it rises to the height of the siphon, or to the chin of the image, the water will begin to run through the siphon concealed in the figure, till the cup is emptied in the manner explained under Siphon.

TA'NTAMOUNT. *s.* (French.) Equivalent (*Locke*).

TANTI'VY. *ad.* To ride *tantivy* is to ride with great speed.

TA'NTLING. *s.* (from *Tantalus.*) One seized with hopes of pleasure unattainable (*Shakspeare*).

TAOO, the most southern of the Friendly Islands, in the South Pacific ocean, about 10 leagues in circuit. It has several springs inland, and a small stream of good water, which reaches the sea when the springs are copious. The S.E. side rises with great inequalities immediately from the sea; so that the plains and meadows, of which there are some of great extent, lie all on the N.W. side; and are adorned with tufts of trees, intermixed with plantations, and intersected by paths leading to every part of the isle.

To TAP. *v. a.* (*tappen*, Dutch.) 1. To touch lightly; to strike gently. 2. To pierce a vessel; to broach a vessel (*Shakspeare*).

Tap. *s.* (from the verb.) 1. A gentle blow (*Gay*). 2. A pipe at which the liquor of a vessel is let out (*Derham*).

TAPE. *s.* (ꞇæppan, Saxon.) A narrow fillet or band (*Pope*).

Tape-worm, in helminthology. See Tæniæ and Worms.

TA'PER. *s.* (ꞇapeꞃ, Sax.) A wax candle; a light (*Taylor*).

Ta'per. *a.* (from the form of a *taper.*) Regularly narrowed from the bottom to the top; pyramidal; conical (*Dryden*).

To Ta'per. *v.n.* To grow gradually smaller.

TAPESTRY, or Tapistry, a curious kind of manufacture, serving to adorn a chamber, or other apartment, by hanging or lining the walls thereof.

Some use tapestry as a general name for all kinds of hanging, whether woven or wrought with the needle; and whether silken, woollen, linen, leathern, or of paper (in which they are countenanced by the etymology of the word, formed from the French *tappiser*, to line; of the Latin *tapes*, a cover of a wall or bed, &c.). But, in the common use of our language, the term is now appropriated to a kind of woven hangings, of wool and silk, frequently raised and enriched with gold and silver, representing figures of men, animals, landscape, &c. The invention of tapestry seems to have come from the Levant, and what makes this the more probable is, that formerly the workmen concerned herein were called, at least in France, Sarazins, or Sarazinois.

Some have supposed that the English and Flemish, who were the first that excelled therein, might bring the art with them from some of the croisades or expeditions against the Saracens. Accordingly they say, that those two nations were the first who set on foot this noble and rich manufacture in Europe, which afterwards became one of the finest ornaments of palaces and churches, &c. At least, if they be not allowed the inventors, they have the honour of being the restorers of this curious and admirable art, which gives a kind of life to wools and silks, in some respects not inferior to the paintings of the best masters. However, it does not appear at what precise era this manufacture was introduced into Europe; nor is it certain to whom it was owing.

Guicciardin, in his Description and History of the Netherlands, printed at Antwerp in 1582, ascribes the invention of the art of making tapestry hangings to the Netherlanders, but he does not assign the time of the invention.

The art of weaving tapestry was brought into England by William Sheldon, esq. about the end of the reign of Henry VIII. See Dugdale's Warwickshire in Stemmate Sheldon, p. 584.

In the reign of king James the manufacture of tapestry was set up at Mortlake, in Surry. Aubrey, indeed, in his history of that county, dates its institution in the subsequent reign; but Loyd (State Worthies, p. 953.) is not only positive for the former era, but affirms, that at the motion of king James himself, who gave two thousand pounds towards the undertaking, sir Francis Crane erected the house at Mortlake for the execution of his design; and this is confirmed by authentic evidence; for, in Rymer's Fœdera, vol. xviii. p. 66, there is an acknowledgment from king Charles in the first year of his reign, viz. 1625, that he owes six thousand pounds to sir Francis Crane for tapestry: and he grants to him two thousand pounds yearly, for ten years, towards the maintenance of the said work.

These works at Mortlake, which at first had been conducted after old patterns, were afterwards formed from designs both in history and grotesque, furnished by Francis Cleyn, and thus carried to singular perfection.

From the deed above recited it is plain, that the manufacture was then arrived at great perfection. See Mr. Walpole's Anecdotes of Painting in England, vol. ii. p. 36.

In the year 1663, a statute was enacted (cap. 15.) for the encouragement of linen and tapestry manufactures of England, and discouragement of the very great importation of foreign linen and tapestry.

Next to the English, the Flemings were most expert at weaving of rich hangings: the French, who subsequently exceeded all other nations in this art, did not apply themselves to it till the reign of their Henry IV. when an establishment was made in the year 1607 in the Fauxbourg St. Michael at Paris; after the assassination of that monarch, the manufactory was neglected, nor was it revived till the reign of Louis XIV. under the auspices of Colbert, who caused a receptacle for this work to be constructed, where two brothers, named Giles and John Gobelins, had long before been celebrated as excellent dyers, whence the name, which an edict issued by Louis confirmed under the title of Hotel Royal des Gobelins. As it was the intention of the luxurious monarch just mentioned to excel all his contemporary sovereigns of Europe in the splendour of his palaces and establishments, the manufactory of the Gobelins was placed by him under a complete system of government, and it flourished with some fluctuations of neglect and encouragement as a royal institution, till the late revolution, during which dreadful period it was consigned, to all appearance, to irretrievable ruin; but the subsequent consulship of Bonaparte, and his further elevation to the throne of France, has in a great degree recovered it, though the change in public opinion in the manner of decorating walls will prevent it from obtaining its pristine encouragement.

The reader will forgive our enlarging on this subject, as the Gobelins is the only manufactory of tapestry remaining in Europe worthy of particular notice, and where paintings are imitated with all the strength and beauty of colouring of the pictures from which they are copied. M. Le Maistre, who visited Paris in 1802, mentions two pieces made about that time, one representing the assassination of admiral Coligni, and the other the heroic conduct of the president Molé, of uncommon excellence. Ninety persons were then employed, and appeared to work with the utmost ease, though six years apprenticeship and much attention and care are required to attain superior skill. Previously to the change in the government of France, the workmen were in a great degree state prisoners, but such is the jealousy of rivalship, that they are still under the special care or surveillance of the police; and the pieces manufactured were destined principally to ornament the favourite residence of St. Cloud, and some other public buildings. To this information we shall subjoin the still more recent account of Mr. Pinkerton in 1805. "In the ancient method," says that gentleman, "the workmen were obliged to stoop, which was found detrimental to their health, and the pictures were destroyed, being cut in pieces in the width of the loom; the figures were also reversed. Neilson, an intelligent foreman, contrived to save the pictures, in tracing them with oil-paper. Nor were the figures reversed as before, and the picture itself was placed behind the workman, that he might accurately express the shades and tone of colour. Still the result could not be judged of, till each division was perfected in the loom. Vaucanson superadded an easy and ingenious mechanism, to examine with pleasure the progress of the work; but the manufacture continued to be guided by a servile routine."

The last director introduced three improvements, which cannot very well be explained, but the result has been of great advantage in the manner of weaving, and as more judgment has been evinced in the selection of pictures for copying, the style of colouring partakes more of the taste of each master than when it was the custom to make all the tints vivid and gaudy; besides, as they have ceased to use silk, the tapestry is much less subject to fade. "Yet," adds Mr. Pinkerton, "the colours are sufficiently bright and various to represent, with exquisite truth, all the fine tints of beautiful flowers. It is however to be regretted that these splendid tapestries become so expensive, from the length of time required in the workmanship, that even the rich tremble: and the sale to the government, which presents them to distinguished foreigners, affords the chief if not sole consumption. The sum annually allowed, to support the manufacture in its greatest activity, is estimated at one hundred and fifty thousand francs."

At Brussels and Antwerp they succeed both in human figures and animals, and in landscapes; and that both with respect to the designing and the workmanship. At Oudenard their landscapes and animals are good, but their human figures bad. Lisle, and a few other places, come behind Oudenard. The French manufacture of Felletin does tolerably well in landscapes, Aubusson in figures, and Beauvois in both.

The usual widths of tapestries are from two ells to three ells and a half, Paris measure.

The manufacture of tapestry of each kind is too curious to be here passed over without a short description.

Manufacture of tapestry of the high warp.—The loom whereon this is wrought is placed perpendicularly: it consists of four principal pieces; two long planks or cheeks of wood, and two thick rollers, or beams. The planks are set upright, and the beams across them, one at top and the other at bottom, a foot distance from the ground. They have each their trunnions, by which they are suspended on the planks, and are turned with bars. In each roller is a groove, from one end to the other, capable of containing a long round piece of wood, fastened therein with hooks. Its use is to tie the ends of the warp to. The warp, which is a kind of worsted, or twisted woollen thread, is wound on the upper roller; and the work, as fast as woven, is wound on the lower.

Withinside the planks, which are seven or eight feet high, fourteen or fifteen inches broad, and three or four thick, are holes pierced from top to bottom, in which are put thick pieces of iron, with hooks at one end, serving to sustain the coat-stave: these pieces of iron have also holes pierced in them, by putting a pin in which, the stave is drawn nearer, or set farther off; and thus the coats or threads are stretched or loosened at pleasure. The coat-stave is about three inches diameter, and runs all the length of the loom; on this are fixed the coats, or threads, which make the threads of the warp cross each other. It has much the same effect here as the spring-stave and treddles have in the common looms. The coats are little threads fastened to each thread of the warp, with a kind of sliding-knot, which forms a sort of mash or ring. They serve to keep the warp open, for the passage of broaches wound with silks, woollens, or other matters used in the piece of tapestry.

Lastly, there are a number of little sticks, of different lengths, but all about an inch diameter, which the workman keeps by him in baskets, to serve to make the threads of the warp cross each other, by passing them across: and that the threads thus crossed may retain their proper situation, a packthread is run among the threads above the stick.

The loom thus formed, and mounted with its warp, the first thing the workman does, is to draw, on the threads of this warp, the principal lines and strokes of the design to be represented on the piece of tapestry; which is done by applying cartoons made from the painting he intends to copy, to the side that is to be the wrong side of the piece; and then with a black lead pencil following and tracing out the contours thereof, on the thread of the right side; so that the strokes appear equally both before and behind. As to the original design the work is to be finished by, it is hung up behind the workman, and wound on a long staff, from which a piece is unrolled, from time to time, as the work proceeds.

Besides the loom, &c. here described, there are three other principal instruments required for working the silk, or wool of the woof within the threads of the warp. These are a broach, a reed, and an iron needle.

The broach is of hard wood, seven or eight inches long, and two-thirds of an inch thick, ending in a point, with a little handle. It serves as a shuttle, the silks, woollens, gold, or silver, to be used in the work, being wound on it. The reed or comb is also of wood, eight or nine inches long, and an inch thick at the back; whence it usually grows less and less, to the extremity of the teeth, which are more or less apart, according to the greater or less degree of fineness of the intended work.

Lastly, the needle is in form of a common needle, only bigger and longer. Its use is to press close the wool and silks, when there is any line or colour that does not sit well.

All things being prepared for the work, and the workman ready to begin, he places himself on the wrong side the piece, with his back towards the design; so that he works, as it were, blindfold, seeing nothing of what he does; and being obliged to quit his post, and go to the other side the loom, whenever he would view and examine the piece, to correct it with his pressing-needle.

To put any silk, &c. in the warp, he first turns and looks at his design; then taking a broach full of the proper colour, he places it among the threads of the warp, which he brings across each other with his fingers, by means of the coats or threads fastened to the staff: this he repeats every time he is to change his colour.

The silk or wool being placed, he beats it with his reed or comb; and when he has thus wrought in several rows over each other, he goes to see the effect they have; in order to reform the contours with his needle, if there be occasion.

As the work advances, they roll it up on the lower beam, and unroll as much warp, from the upper beam, as suffices them to continue the piece: the like they do of the design behind them. When the pieces are wide, several workmen may be employed at once.

We have but two things to add: the first, that this high warp tapestry goes on much more slowly than the low warp, and takes almost double the time and trouble. The second, that all the difference the eye can observe between the two kinds consists in this, that, in the low warp, there is a red fillet, about one-twelfth of an inch broad, running on each side from top to bottom; which is wanting in the high warp.

Manufacture of tapestry of the low warp.—The loom or frame, whereon the low warp is wrought, is much like that of the weavers: the principal parts thereof are two strong pieces of wood, forming the sides of the loom, and bearing a beam or roller at each end; they are sustained at bottom with other strong pieces of wood, in manner of trestes; and, to keep them the firmer, they are likewise fastened to the floor with a kind of buttresses, which prevent any shaking, though there are sometimes four or five workmen leaning on the fore-beam at once.

The rollers have each their trunnions, by which they are sustained: they are turned by large iron pins three feet long. Along each beam runs a groove, wherein is placed the wich, a piece of wood of about two inches diameter, and almost of the length of the roller: this piece fills the groove entirely, and is fastened therein, from space to space, by wooden pins. To the two wiches are fastened the two extremities of the warp, which is wound on the farther roller; and the work, as it advances, on the nearer.

Across the two sides, almost in the middle of the loom, passes a wooden bar, which sustains little pieces of wood, not unlike the beam of a balance: to these pieces are fastened strings, which bear certain spring staves, wherewith the workman, by means of two treddles under the loom whereon he sets his feet, gives a motion to the coats, and makes the threads of the warp rise and fall alternately. Each loom has more or fewer of these spring-staves, and each staff more or fewer coats, as the tapestry consists of more or fewer threads.

The design or painting the tapestry-man is to follow is placed underneath the warp; where it is sustained from space to space with strings, by means of which the design is brought nearer the warp.

The loom being mounted, there are two instruments used in working of it; viz. the reed, and the flute. The flute does the office of the weaver's shuttle; it is made of hard polished wood, three or four lines thick at the ends, and somewhat more in the middle, and three or four inches long. On it are wound the silks, or other matters, to be used as the woof of the tapestry. The comb or reed is of wood or ivory; it has usually teeth on both sides; it is about an inch thick in the middle, but diminishes each way to the extremity of the teeth: it serves to beat the threads of the woof close to each other, as fast as the workman has passed and placed them with his flute among the threads of the warp.

The workman is seated on a bench before the loom, with his breast against the beam, only a cushion or pillow between them; and, in this posture, separating, with his fingers, the threads of the warp, that he may see the design underneath, and taking a flute, mounted with a proper colour, he passes it among the threads, after having raised or lowered them, by means of the treddles moving the spring-staves and coats.

Lastly, to press and close the threads of the silk or yarn, &c. thus placed, he strikes each course (i. e. what the flute leaves in its passing and coming back again) with the reed.

What is very remarkable in the manufacture of the low warp is, that it is all wrought on the wrong side; so that the workman cannot see the right side of his tapestry, till the piece be finished and taken out of the loom.

Mr. Le Blon, in endeavouring to fix the true harmony of colouring in painting, found that all visible objects may be represented by the three primitive colours, red, yellow, and blue; because out of these, all others, even black itself, may be compounded.

From the principle of producing any visible object with a small number of colours, as represented under the article MEZZOTINTO, and from observing the compounded colours which were reflected from two pieces of silk of different colours, placed near to one another, he arrived at the skill of producing in the loom all that the art of painting requires. In weaving, indeed, he has been obliged to make use of white and black threads, besides red, yellow, and blue; and though he found that he was able to imitate any picture with these five colours, yet for cheapness and expedition, and to add a brightness where it was required, he found it more convenient to make use of several intermediate degrees of colours.

In his new way of weaving tapestry in the loom with a draw-boy, it may be performed almost as expeditiously as fine brocades; for when the loom is once set and mounted, any common draught-weaver, unacquainted with drawing or painting, and indeed hardly knowing what figure he is about, may exactly produce what the painter hath represented in the original pattern: and thus a piece of tapestry may be woven in a month or two, which, in the common way of working, would take up several years: and what in the common way costs a thousand pounds, may, by this means, be afforded finer and better for a hundred.

The main secret of this art consists in drawing the patterns, from which any common draught-weaver can mount the loom; and when that is done, the piece may be made of any size, by only widening the reeds and the warp: and a reverse may be made with the same ease; which is done by the boy's pulling the lashes up again in the same order in which he pulled them down before: by which contrivance the tapestry may be suited to any room, whether the light comes in on the right, or on the left. The patterns are painted upon paper, whereon are printed squares from copper-plates, and these subdivided by as many lines as answer to the threads of the warp, which run lengthwise of the piece; then they try how many threads of the shoot answer in breadth to every subdivision of the squares. Every thread of the warp goes through a small brass ring called a male, or through a loop in the leish, and hath a small long weight or lingoe hung below, to counterbalance the packthreads, which going from the top of the rings or loops, are passed over the pulleys in the table directly over the loom, and are continued nearly in an horizontal position on one side of the loom to a convenient distance; where they are all spread on a cross piece fastened to two staples: these are called the tail of the mounture; and from each of these packthreads, just by the side of the loom, are fastened other packthreads, called simples, which descend to the ground; so that by pulling these simple cords, you raise any of the threads of the warp at pleasure: wherefore they fasten a loop or potlart to as many of these simple cords as there are threads of the warp to be pulled up at every shoot, or every throw of the shuttle; by which means the shoot shews itself on the right side, where the warp is pulled up: and in ordering this, they are guided by the pattern, on which they count the distances of the subdivisions, which contain the same colours in the same line, and can be shot at once: then they fasten potlarts to the several simple cords that draw up the rings, through which those threads of the warp run, which are to lie behind this colour; they tie all these loops together, and fasten a piece of worsted or silk to the knot, of the same colour that the workman is to throw; and the boy, when he pulls each loop, names the colour, that the weaver may take the proper shuttle, and so on for every colour to be thrown.

TAPET. *s.* (*tapitia*, Latin.) Worked or figured stuff.

TAPIOCA, a species of starch which the Brazilians make from the roots of the cassada plant, which is already described under its botanical name Jatropha.

TAPIR, in zoology, a genus of the class mammalia, order belluæ. Fore-teeth in each jaw ten; tuskless; hoofs on the fore-feet four, hind-feet three.

One species only, T. Americanus. Snout long, extensile, flexible. General shape that of a hog: size that of a heifer half a year old. When young, his body is speckled with white. after he is full grown, it changes to a dusky colour. The nose bears some resemblance to the proboscis of an elephant; extending far beyond the lower jaw, and being susceptible of contraction or dilatation at the pleasure of the animal: its sides are furrowed in a singular manner. Only the male, however, is armed with this proboscis; the snout of the female is not prominent, nor her upper jaw prolonged beyond the lower. The extremities of both jaws are pointed; each contains ten cutting teeth, and five grinders. The ears are erect, oval, and bordered with white. The eyes are small; the back arched; the legs short; the tail bare, and of a very diminutive size. The hair over the body is short. A bristly mane, the hair of which is an inch and a half in length, runs along the neck.

South America is the native country of the tapir. He inhabits along the eastern side of the Dutch, Portuguese, and Spanish dominions in that part of America; and is one of the largest quadrupeds of the new world. Marshes, and solitary woods, bordering on some lake or river, are his favourite retreats. In the heat of the day he conceals himself in the gloom of the forest, or under water; for like the hippopotamus, he is, in some measure, amphibious, swims well, or dives and walks at his ease on the bottom. If roused from the forest, he retreats to the water for security. At night he wanders abroad in search of food. He lives on grass, sugar-canes, and fruits. His voice is a kind of hiss: he is a salacious, slow, and sluggish animal; and an object of pursuit to the Indian hunters. His skin often resists an arrow or musket ball; and when harassed by dogs, he forgets his natural mildness, turns upon them, and often mutilates their limbs. Yet his skin is sometimes penetrated by the poisoned arrows of the Indians; and numbers of dogs will overpower him, although a part fall in the attack.

He is not unsusceptible of domestication. In Guiana, the tapir is sometimes introduced into the farm-yard. When gently treated, like other naturally mild animals, he contracts great familiarity with man, distinguishes his master, discovers affection to the hand that feeds him, and learns so much roguery as to slip his nose into the pockets of people who approach him, in search of food.

The thickness, and the close texture of his skin, render it an article of considerable value. The Indians chiefly employ it for bucklers. The flesh is eaten by them, but not esteemed very delicate.

TAPPING, in anatomy and surgery. See Paracentesis and Surgery.

TA′PROOT. *s.* The principal stem of the root (*Mortimer*).

TA′PSTER. *s.* (from *tap*.) One whose business is to draw beer in an alehouse (*Swift*).

TAPSUS BARBATUS. See Verbascum.

TAR. (ꞇaꞃe, Saxon; *tarre*, Dutch; *tiere*, Dan. *goudron*, Fr.) Pix liquida. A thick dark brown or black resinous adhesive juice, of the nature of turpentine, melted by fire from the wood and roots of old pines and fir-trees, during which process the wood itself is reduced to charcoal. Pitch is tar inspissated by boiling. And hence these substances chiefly differ from other turpentines and terebenthinate balsams in the manner in which they are obtained from the same family of plants: the latter being procured by incision, without the use of fire, and in a state of simple exsudation.

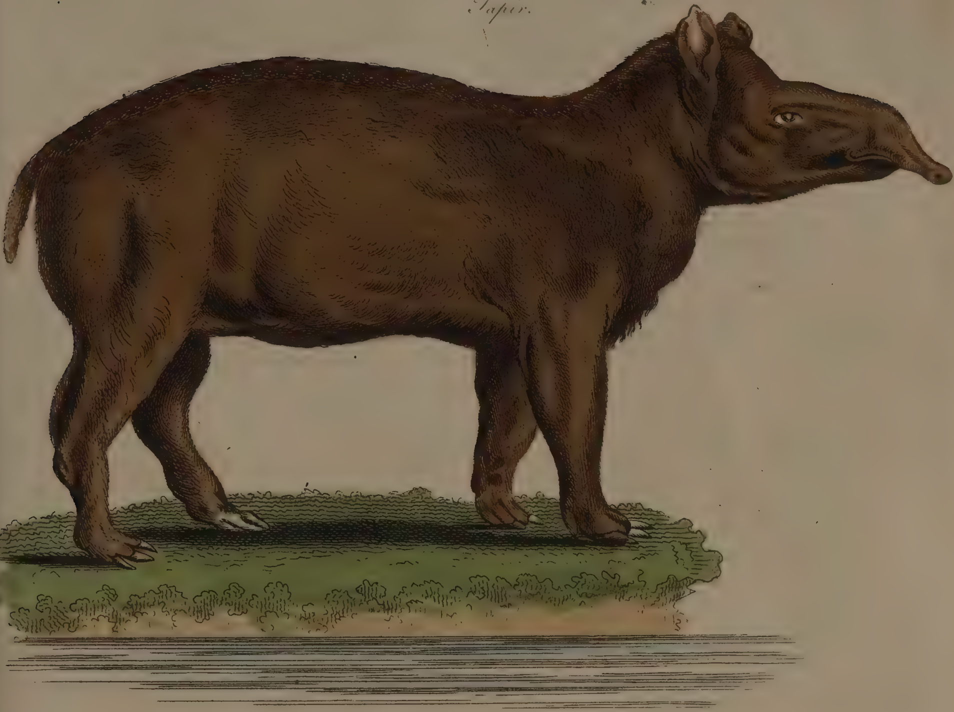
Every part of the tree which is at all resinous is fit for obtaining tar, but in particular it is the red wood and the hard roots that yield the best and in the largest quantity. As the wood is entirely charred in the process, all the sap and other volatile parts must be expelled, most of which mixes with the turpentine that sweats out and constitutes tar; and hence this substance must considerably vary in the quality and proportion of resin, empyreumatic oil, and acid which it contains, according to the age of the tree, the soil on which it grows, the part selected, the management of the heat, &c.

The extraction of tar from pine trees is very ancient, being described by Threophrastus, Dioscorides, and other old writers, according to whom the method of proceeding was extremely simple. Very large stacks were made of billets of pine, and covered with turf, to prevent the volatile parts from being dissipated. They were then kindled, and suffered to burn with a low smothered flame, during which the tar melted out by the heat flowed to the bottom of the stack, and ran out by a small channel cut for the purpose.

A very large proportion of the tar actually made in Norway and the other Baltic countries, is still prepared in this rude manner. The stacks are built upon the slope of a hill, covered with moss and turf, kindled, and the tar that oozes out is collected and put into barrels. But a more economical and scientific method is practised in France and Switzerland, which is to heat the wood in large brick ovens, built for the purpose, whereby the wood is charred much more equally, and the tar is of a much more uniform and probably of a better quality.

The following is the method practised in the Valais. The pines are felled in the preceding year, that the wood may be dry enough when wanted, and the outer bark and twigs being stripped off, the rest of the tree is cut up into billets of tolerably equal size. The oven is built

Tapir.



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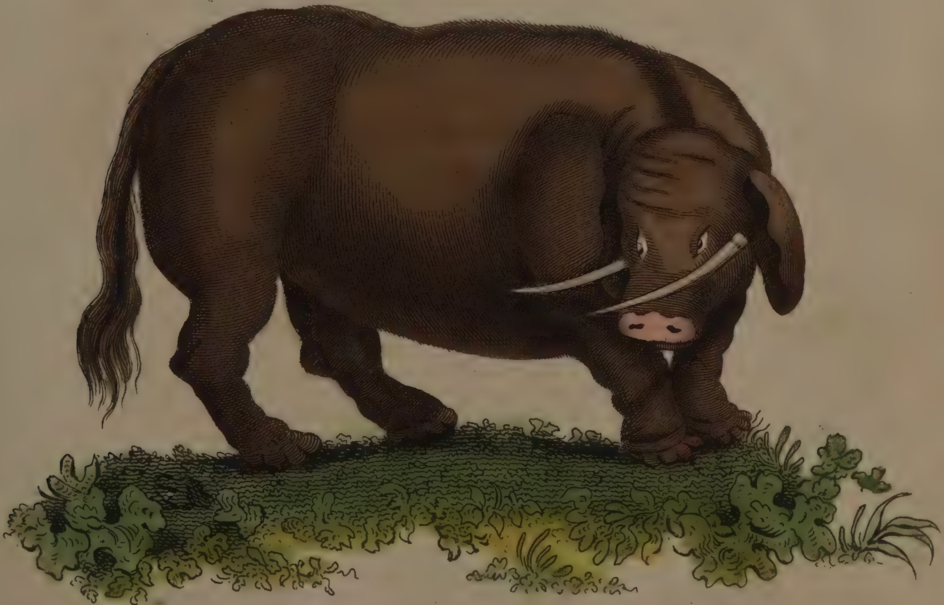


London, Published by Sherwood & Co. Paternoster Row, Oct. 1st 1812.

of stone or brick, in the form of an egg standing on its small end. The floor is made either of a single stone, scooped out into a hollow, or of several joined closely together. On one side of it, about five inches above the lowest part, is a hole, into which a large gun-barrel is thrust, which serves to carry off the liquid tar as it collects. A large iron grate is laid at the bottom of the oven. The largest of these ovens are about ten feet high, and five or six feet in the largest diameter. To charge the oven bundles of these billets are thrown in, and the wood spread as evenly as possible, the interstices being filled with chips, till the top is nearly reached. The whole is then covered with a layer of chips, and the top of the furnace is closed with flat stones heaped one upon the other, gradually lessening the opening, and forming a kind of vaulted chimney, the mouth of which is four or five inches across. The dry chips on the top of the furnace are then set on fire, when the heat spreads downwards till the whole of the charge is judged to be sufficiently kindled. The chimney is then entirely closed with a large stone, and wet earth is heaped on the stones at top, and thrown on whenever the smoke bursts out too strongly. The melting now begins: the tar falls down to the bottom, fills the hollow of the floor, (which last detains any bits of wood or other impurities,) and runs off through the gun-barrel into casks placed to receive it. Some skill is required in managing the fire, which must occasionally be refreshed by letting in a small draught of air through small holes left for the purpose in the sides of the kiln. When the process is over the wood is found completely charred, and is taken away; and the oven, after being cleared out, is filled again. It is found that the red wood and knots, which are richest in resins, will yield about a fourth of their weight of tar; but the general average of product is about ten or twelve per cent. of the weight of the whole charge. After each process a quantity of lamp-black is collected beneath the stones that form the vault of the temporary chimney.

Lamp-black, therefore, is another product from the pine, capable of being obtained in the process of working for tar, but in the large way is procured by a somewhat different means. See the article LAMP-BLACK.

A substance somewhat resembling tar, called *brai-gras*, and much used in the French ports for careening ships, is made in the following way. The oven above described is charged with alternate layers of chips of green wood, and billets of dry, and all the refuse matter of turpentine, the straw through which turpentine has been strained, and the like. Over the whole is laid a stratum of *brai-sec* or resin, and the gun-barrel pipe is stopped up, and not tapped till the whole of the wood is reduced to charcoal. The vault of the oven is also covered more carefully after the charge is sufficiently kindled, and the whole process is carried on more slowly. The heat of the fire melts the resin at top, which mixes with the resinous sap, and the whole collects into a dark resinous liquid at the bottom. When sufficiently cooled it is drawn off and barrelled. The *brai-gras* is of an intermediate consistence between tar and resin.

We have already observed that pitch, at least as employed in our own country, is simply tar inspissated to the requisite degree by boiling. It does not appear, however, that the French have this precise preparation, as the substance called *poix* is made either by melting together due proportions of resin and tar, or else by filling a kind of oven with various refuse matters from the turpentine, such as the straw through which it is strained, together with the coarse strainings, chips of bark soaked in turpentine, the broken earth of the moulds in which the resin collects, &c. kindling it till all the resin falls down into a reservoir, and continuing the heat till it is sufficiently inspissated. This forms a hard black mass called *poix dure* or *pegle*.

The pitch made in our own country, by boiling down tar to the proper consistency, is now performed near London and in some other parts, in a still, with a worm-tub attached to it, in order to collect the valuable volatile productions of the tar. The process is as follows: the barrels of tar being of various consistence, their contents are first emptied into a copper, and gently heated and well-stirred, to render them thin and uniform. The tar is then laded into the still, and at the same time passed through a sieve to keep out chips of wood and other impurities. When the still is properly luted the fire is kindled, and kept up very moderate for three hours, the tar being very apt to boil up in the early part of the process. The first process that distils over is principally a brown acid water, mixed however with a good deal of oil. The length of the process varies according to the quality and hardness of the pitch required. In general, a still that holds about 600 gallons will work eighteen or twenty barrels of tar in eight hours; the produce of which will be about ten barrels of pitch, (or 22 cwt.); 176 gallons of oil; and about 40 gallons of acid. The pitch remains in the still for twelve hours; after which it is barrelled, and hardens as it cools.

The oil and acid water which distil over do not mix, so that they may be easily separated by distillation. The oil is a brownish inferior kind of oil of turpentine, very useful in painting ships and other out-door work. The acid is a very strong, brownish, empyreumatic acid, which appears very closely to resemble the pyroligneous acid obtained from the distillation of wood during its conversion to charcoal, and is now employed pretty largely in composing several of the mordants made use of in calico-printing.

TAR (Barbadoes). See PETROLEUM BARBADENSE.

TAR TREE. See PINUS.

TAR. *s.* (from *tar* used in ships.) A sailor; a seaman, in contempt (*Swift*).

To TAR. *v. a.* (from the noun.) 1. To smear over with tar. 2. To tease; to próvoke. (ταραττω.) (*Shakspeare*).

TARANTO, a seaport of Naples, in Terra d'Otranto, with an archbishop's see. It is seated on a peninsula, and defended by a strong castle: but the harbour is choked up, which has hurt it very much. This town gave name to the venemous spiders called tarantulas. It is 55 miles N.W. of Otranto, and 150 E. by S. of Naples. Lon. 17. 29 E. Lat. 40. 35 N. See TARENTUM.

TARAGALLA, a town of the kingdom of Tafilet, with a castle, seated on the Dras, 275 miles S.W. of Tafilet. Lon. 6. 3 W. Lat. 27. 40 N.

TARANTISMUS. (from *tarantula*, the animal whose bite is supposed to be cured only by music.) The desire of dancing which is produced by the bite of the tarantula.

TARANTULA, in the entomology of Fabricius, a tribe of the genus PHALANGIUM, which see.

The tarantula of popular language, however, is a species of the genus aranea or spider; the largest of all the European species, of a brown colour, with the back of the abdomen marked by a row of trigonal black spots with whitish edges, and the legs barred with black and white. It is a native of the south of Europe, and is three quarters of an inch in length, the body covered all over with down, generally of an olive dusky brown. The external parts resemble those of the rest of the genus: it has eight eyes and as many legs; the front armed with serrated pincers.

The bite of the tarantula is said, but without foundation, to be attended with fatal consequences. After violent pains and sickness, the unhappy victim, it is said, is seized with an involuntary laughter; dances without intermission, exhibiting all the symptoms of insanity. At the return of the season in which he was bit, the patient's madness begins again to appear; and these troublesome relapses, after having recurred for several years, at last terminate in death.

Music and dancing, as the fiction proceeds, is the only remedy for this dreadful malady. The musician begins to play a tune famous for the cure, slow at first, but increasing in quickness as the patient seems affected. After continuing this ridiculous, but violent exercise, till a profuse perspiration is brought on, the imaginary venom is forced from the system, and the cure is completed. Such were the reputed effects of the bite of the tarantula, till travellers of discernment traced the whole fiction to the artifice of the peasants of Apulia, who for a small sum had been in the habit of allowing themselves to be bitten, and then counterfeited madness, to astonish the wondering multitude. Like several species of phalangium it is poisonous in a small degree, but perhaps never fatally so.

TARARE, a town of France, in the department of Rhone and Loire, seated on the Tordive, at the foot of a mountain of the same name, 25 miles N.W. of Lyons. Lon. 4. 43 E. Lat. 45. 52 N.

TARASCON, a town of France, in the department of the Mouths of the Rhone, with a castle, seated on the Rhone, opposite Beaucaire, with which it communicates by a bridge of boats. Its commerce consists in oil, brandy, starch, and stuffs that are much worn, one sort being of coarse silk, and the other of the same material and wool. It is 10 miles N. of Arles, and 375 S. by E. of Paris. Lon. 4. 39 E. Lat. 43. 48 N.

TARAXACUM. (ταραξακον, from ταρασσο, to alter or change; because it alters the state of the blood.) Dens leonis. The dandelion, or pissabed. Leontodon taraxacum caule squamis inferne reflexis, foliis runcinatis denticulatis lævibus. C. O. Syngenesia, Polygamia æqualis. The young leaves of this plant in a blanched state have the taste of endive, and make an excellent addition to those plants eaten early in the spring as salads; and Murray informs us, that at Gottingen the roots are roasted and substituted for coffee by the poorer inhabitants, who find that an infusion prepared in this way can hardly be distinguished from that of the coffee-berry. The expressed juice of dandelion is bitter and somewhat acrid; that of the root is bitterer, and possesses more medicinal power than any other part of the plant. It has been long in repute as a detergent and aperient, and its diuretic effects may be inferred from the vulgar name it bears in most of the European languages, quasi lecti minga et urinaria herba dicitur; and there are various proofs of its efficacy in jaundice, dropsy, consumption, and some cutaneous disorders. See LEONTODON.

TARCHON SYLVESTRIS. See PTARMICA.

TARCONANTHUS. Flea-bane. In botany, a genus of the class syngenesia, order polygamia æqualis. Receptacle villous; seeds wrapped in down; calyx one-leafed, half seven-cleft, turbinate. Five species; all natives of the Cape, of which one, T. camphoratus, shrubby African flea-bane, is cultivated. The leaves are oblong, very entire, downy underneath; the stem rises twelve or fourteen feet, sending out many woody branches at the top; the leaves small, like rosemary; the flowers are produced in spikes at the extremity of the shoots, of a purple hue. It retains its leaves all the year, and may be increased by cuttings in the spring and summer; being afterwards treated as a green-house plant.

TARDA'TION. *s.* (*tardo*, Lat.) The act of hindering or delaying.

TA'RDIGRADOUS. *a.* (*tardigradus*, Latin.) Moving slowly (*Brown*).

TA'RDILY. *ad.* (from *tardy.*) Slowly; sluggishly (*Shakspeare*).

TA'RDINESS. *s.* (from *tardy.*) Slowness; sluggishness; unwillingness to action or motion.

TA'RDITY. *s.* (*tarditas*, Latin.) Slowness; want of velocity (*Digby*).

TA'RDY. *a.* (*tardus*, Latin; *tardif*, Fr.) 1. Slow; not swift (*Sandys*). 2. Sluggish; unwilling to action or motion (*Prior*). 3. Dilatory; late; tedious (*Waller*). 4. Unwary. A low word (*Hudibras*). 5. Criminal; offending. A low word (*Collier*).

To TA'RDY. *v. a.* (*tarder*, French.) To delay; to hinder (*Shakspeare*).

TARE, in botany. See ERVUM.

TARE is an allowance for the outside package that contains such goods as cannot be unpacked without detriment; or for the papers, threads, bands, &c. that inclose or bind any goods imported loose; or though imported in casks, chests, &c. yet cannot be unpacked and weighed neat.

TARE. The preterit of *tear*.

TARENTUM, or TARENTUS, a town of Calabria, situate on a bay of the same name, near the mouth of the river Galesus. It was founded, or rather repaired, by a Lacedæmonian colony, about 707 years before Christ, under the conduct of Philanthus. It was long independent, and could once arm 100,000 foot and 3000 horse. The people of Tarentum were so luxurious and voluptuous, that "the delight of Tarentum" became proverbial. The Tarentine war is greatly celebrated in history. This war, which had been undertaken B. C. 281, by the Romans, to avenge the insults which the Tarentines had offered to their ships when near their harbours, was terminated after ten years; 30,000 prisoners were taken, and Tarentum became subject to Rome. It was for some time the residence of Pythagoras, who inspired the citizens with the love of virtue, and rendered them superior to their neighbours in the cabinet as well as in the field of battle. The large, beautiful, and capacious harbour of Tarentum is greatly commended by ancient historians. See TARANTO, which is the modern town standing on the same site.

TARGE. TA'RGET. *s.* (ȝaꞃȝa, Saxon.) A kind of buckler or shield borne on the left arm (*Spenser. Milton*).

TARGET is also the name of a mark for the artillery to fire at, or for archers to shoot at, in their practice.

TARGET-SHAPED, in botany. See PELTATE.

TARGETIER, one armed with a target.

TARGIONIA, in botany, a genus of the class cryptogamia, order hepaticæ. Calyx of two concave valves; seeds numerous, collected into a globe. One species only, targionia pypophylla, a native of our own country.

TARGUM, a name given to the Chaldee paraphrases of the books of the Old Testament. They are called paraphrases or expositions, because they are rather comments and explications than literal translations of the text. They are written in the Chaldee tongue, which became familiar to the Jews after the time of their captivity in Babylon, and was more known to them than the Hebrew itself. So that when the Hebrew text was read in the synagogue, or in the temple, they generally added to it an explication in the Chaldee tongue for the service of the people, who had but a very imperfect knowledge of the Hebrew tongue. It is probable, that even from the time of Ezra this custom began, since this learned scribe, reading the law to the people in the temple, explained it, with the other priests that were with him, to make it understood by the people. Nehem. viii. 7—9.

But though the custom of making these sorts of expositions in the Chaldee language be very ancient among the Hebrews, yet have they no written paraphrases or targums before the era of Onkelos and Jonathan, who lived about the time of our Saviour. Jonathan is placed about thirty years before Christ, under the reign of Herod the Great. Onkelos is something more modern. The targum of Onkelos is the most of all esteemed, and copies are to be found in which it is inserted verse for verse with the Hebrew. It is so short and so simple, that it cannot be suspected of being corrupted. This paraphrast wrote only upon the books of Moses; and his style approaches nearly to the purity of the Chaldee, as it is found in Daniel and Ezra. This targum is quoted in the Misna, but was not known either to Eusebius, St. Jerome, or Origen.

The targum of Jonathan, son of Uziel, is upon the greater and lesser prophets. He is much more diffuse than Onkelos, and especially upon the lesser prophets, where he takes great liberties, and runs on in allegories. His style is pure enough, and approaches pretty near to the Chaldee of Onkelos. It is thought that the Jewish doctors who lived above 700 years after him made some additions to him.

The targum of Joseph the Blind is upon the Hagiographa. This author is much more modern, and less esteemed than those we have now mentioned. He has written upon the Psalms, Job, the Proverbs, the Canticles, Ecclesiastes, Ruth, and Esther. His style is a very corrupt Chaldee, with a great mixture of words from foreign languages.

The targum of Jerusalem is only upon the Pentateuch; nor is that entire or perfect. There are whole verses wanting, others transposed, others mutilated; which has made many of opinion that this is only a fragment of some ancient paraphrase that is now lost. There is no targum upon Daniel, or upon the books of Ezra and Nehemiah.

These targums are of great use for the better understanding not only of the Old Testament, on which they are written, but also of the New. As to the Old Testament, they serve to vindicate the genuineness of the present Hebrew text, by proving it to be the same that was in use when these targums were made, contrary to the opinion of those who think the Jews corrupted it after our Saviour's time. They help to explain many words and phrases in the Hebrew original, and they hand down to us many of the ancient customs of the Jews. And some of them, with the phraseologies, idioms, and peculiar forms of speech, which we find in them, do in many instances help us much for the better illustration and better understanding of the New Testament as of the Old; the Jerusalem Chaldee dialect, in which they are written, being the vulgar language of the Jews in our Saviour's time. They also very much serve the Christian cause against the Jews, by interpreting many of the prophecies of the Messiah in the Old Testament in the same manner as the Christians do. Many instances are produced to this purpose by Dr. Prideaux in his Connect. of the History of the Old and New Testaments, vol. iv. p. 777, &c.

These targums are published to the best advantage in the second edition of the great Hebrew bible set forth at Basil by Buxtorf the father, anno 1610; for he has rectified the Chaldee text, and reformed the vowel pointings in it: the targums having at first been written without vowel points, which were afterwards added very erroneously by some Jews.

TARIF, a table or catalogue containing the names of different sorts of merchandize, with the duties to be paid as settled by authority amongst trading nations.

TARN, a department of France, including part of the late province of Languedoc. It takes its name from a river, which has its source in the department of Lozhere, and having watered Mithoud, Alby, Guillac, Montauban, and Moissac, falls into the Garonne. Castres is the capital.

Tarn, from the Islandic, is sometimes used to denote a bog or fen.

To TA'RNISH. *v. a.* (*ternier*, French.) To sully; to soil; to make not bright (*Thomson*).

To Ta'rnish. *v. n.* To lose brightness (*Collins*).

TARODANT, or Tarudant, a town of Morocco, in the province of Sus, seated near the Atlantic, 120 miles S.S.W. of Morocco. Lon. 8. 10 W. Lat. 30. 0 N.

TARPA (Spurius Mætius), a critic of Rome, in the age of Augustus. He was appointed, with four others, in the temple of Apollo, to examine the merit of every poetical composition which was to be deposited in the temple of the muses. All the pieces that were represented on the Roman stage had previously received his approbation.

TARPA'WLING. *s.* (from *tar.*) 1. Hempen cloth smeared with tar (*Dryden*). 2. A sailor, in contempt (*Dennis*).

TARPEIA, the daughter of Tarpeius, the governor of the citadel of Rome, promised to open the gates of the city to the Sabines, provided they gave her their golden bracelets, or, as she expressed it, what they carried on their left hands. Tatius, the king of the Sabines, consented, and, as he entered the gates, to punish her perfidy, he threw not only his bracelet but his shield upon Tarpeia. His followers imitated his example, and Tarpeia was crushed under the weight of the bracelets and shields of the Sabine army. She was buried in the capitol, which, from her, has been called the Tarpeian rock, and there afterwards many of the Roman malefactors were thrown down a steep precipice.

TARPEIUS (Sp.), the governor of the citadel of Rome, under Romulus. His descendants were called Montani and Capitolini.

Tarpeius mons, a hill at Rome, which received its name from Tarpeia, who was buried there. It is the same as the Capitoline hill.

TARQUINII, a town of Etruria, built by Tarchon, who assisted Æneas against Turnus. Tarquinius Priscus was educated there, and he made it a Roman colony when he ascended the throne.

TARQUINIA, a daughter of Tarquinius Priscus, who married Servius Tullius. When her husband was murdered by Tarquinius Superbus, she privately conveyed away his body by night, and buried it. This preyed upon her mind, and the following night she died.—2. A vestal virgin, who, as some suppose, gave the Roman people a large piece of land, which was afterwards called the Campus Martius.

TARQUINIUS PRISCUS, the 5th king of Rome, was son of Demaratus, a native of Greece. Ancus Martius, the reigning monarch, nominated him at his death the guardian of his children. The princes were young, and an artful oration delivered to the people immediately transferred the crown of the deceased monarch on the head of Lucumon. Tarquin reigned with moderation and popularity. He increased the number of the senate, and made himself friends by electing 100 new senators from the plebeians, whom he distinguished by the appellation of *patres minorum gentium*, from those of the patrician body, who were called *patres majorum gentium*. He showed that he possessed vigour and military prudence in the victories which he obtained over the united forces of the Latins and Sabines, and in the conquest of the 12 nations of Etruria. He adorned Rome with many elegant buildings and useful ornaments. He laid the foundations of the capitol, and to the industry and the public spirit of this monarch the Romans were indebted for ther aqueducts and subterraneous sewers. Tarquin was the first who introduced among the Romans the custom to canvass for offices of trust and honour; he distinguished the monarch, the senators, and other inferior magistrates, with particular robes and ornaments, with ivory chairs at spectacles, and the hatchets carried before the public magistrates were by his order surrounded with bundles of sticks, to strike more terror, and to be viewed with greater reverence. Tarquin was assassinated by the two sons of his predecessor, in the 80th year of his age, 38 of which he had sat on the throne, 578 years before Christ.—2. The second Tarquin, sirnamed Superbus, was grandson of Tarquinius Priscus. He was the seventh and last king of Rome. He murdered his father-in-law, and seized the kingdom, at the instigation of his wife Tullia. The crown which he had obtained with violence he endeavoured to keep by a continuation of tyranny. He paid no regard to the decisions of the senate, or the approbation of the public assemblies, and by wishing to disregard both, he incurred the jealousy of the one and the odium of the other. The public treasury was soon exhausted by Tarquin, and to silence the murmurs of his subjects, he resolved to call their attention to war. He was successful in his military operations, but while the siege of Ardea was continued, the wantonness of the son of Tarquin at Rome for ever stopped the progress of his arms; and the Romans no sooner saw the virtuous Lucretia stab herself, not to survive the loss of her honour, than the whole city and camp arose with indignation against the monarch. The gates of Rome were shut against him, and Tarquin was for ever banished from his throne, in the year of Rome 244. He retired among the Etrurians, who attempted in vain to replace him on his throne. Whereupon the republican government was established at Rome. Tarquin died in the 90th year of his age, about 14 years after his expulsion from Rome. He had reigned about 25 years.—3. Collatinus, one of the relations of Tarquin the Proud, who married Lucretia. See COLLATINUS.—4. Sextius, the eldest of the sons of Tarquin the Proud, rendered himself well known by a variety of adventures. When his father besieged Gabii, he came before Gabii with his body all mangled and bloody with stripes. He had no sooner declared that this proceeded from the tyranny and oppression of his father, than the people of Gabii entrusted him with the command of their armies. When he had thus succeeded, he dispatched a private messenger to his father, who gave no answer to be returned to his son. When Sextius heard from the messenger that when the message was delivered Tarquin cut off with a stick the tallest poppies in his garden, he followed the example by putting to death the most noble and powerful citizens of Gabii. The town soon fell into the hands of the Romans. Sextius was at last killed, bravely fighting in a battle during the war which the Latins sustained against Rome in the attempt of re-establishing the Tarquins on their throne.

TARRAGA, or TARREGA, a town of Spain, in Catalonia, seated on a hill, near the river Cervera, 15 miles E. by S. of Lerida, and 60 W. of Barcelona. Lon. 1. 3 E. Lat. 41. 28 N.

TARRAGON, in botany. See ARTEMISIA.

TARRAGONA, a strong seaport of Spain, in Catalonia, with a bishop's see, and a university. It was built by the Phœnicians, was very powerful in the time of the Romans, and has many noble monuments of antiquity. It is surrounded by walls built by the Moors, and is defended also by regular works. It is neither so large nor so populous as it was formerly; for though there is room for 2000 houses within the walls, there is not above 500, which are all built with large square stones. It carries on a great trade, and is seated on a hill, on the Mediterranean, 35 miles N.E. of Tortosa, and 220 miles E. by N. of Madrid. Lon. 1. 13 E. Lat. 41. 5 N.

TARRAS, or TERRAS, in mineralogy, a species of CÆMENTUM, which see.

TA'RRIANCE. *s.* (from *tarry*.) Stay; delay; perhaps sojourn (*Shakspeare*).

TA'RRIER. *s.* 1. A sort of small dog that hunts the fox or otter out of his hole. Properly *terrier*, from *terre*, French, the earth (*Dryden*). 2. One that tarries or stays.

TARRING, a town in Sussex, with a market on Saturday, seated on the downs, not far from the sea, 24 miles E. of Chichester, and 53 S.W. of London. Lon. 0. 21 W. Lat. 50. 50 N.

TARROCK, in ornithology. See LARUS.

To TA'RRY. *v. n.* (*targir*, French.) 1. To stay; to continue in a place (*Shakspeare*). 2. To delay; to be long in coming (*Dryden*). 3. To wait; to expect attending (*Exodus*).

To TA'RRY. *v. a.* To wait for (*Shakspeare*).

TARSI (Extensor minor). In myology. See PLANTARES.

TARSUS. (*ταρσος.*) In anatomy. The tarsus is composed of seven bones, viz. the astragalus, os calcis, os naviculare, os cuboides, and three ossa cuneiformia.

The astragalus is the uppermost bone of the foot, and the most considerable in bulk, if we except the os calcis. Its upper part is formed into a large smooth head, round the basis of which is a rough fossa, that serves for the attachment of ligaments. The upper convex surface of the head, which resembles a pulley, is admitted into the cavity of the tibia; the inner side of this head is flat and smooth, for its articulation with the malleolus internus, while its outer side affords another flat but broader surface, for its articulation with the malleolus externus. Both these lateral surfaces are covered with a cartilage, which is continued from the upper convex part of the head, and descends lower down on the outer than on the inner side. Anteriorly, the astragalus is convex, and covered with cartilage, for its articulation with the os naviculare. The under surface of the bone affords two articulating surfaces, separated by a deep irregular fossa. The anterior of these two surfaces is very small, and slightly convex: the posterior one oblong and concave. They both serve for the articulation of this bone with the os calcis.

The os calcis, or calcaneum, which is the largest bone of the foot, is of a very irregular figure. It is long, and somewhat flattened at its sides. Behind, it is formed into a considerable tuberosity, called the heel, which is slightly hollow above, and rough behind, where the tendo Achillis is inserted into it. Without this tuberosity, which supports us in an erect posture, and when we walk, we should be liable to fall backwards. The upper surface of the bone rises so as to form an irregular, oblong, smooth prominence, which is adapted to the posterior concave surface of the astragalus. The fore-part of this prominence is separated by a narrow fossa, from a small, smooth, and slightly concave surface, situated obliquely, and which receives the small convex surface described at the fore-part of the under surface of the astragalus. Anteriorly, this bone is formed into an oblong, smooth, convex surface, which is circular above, and somewhat pointed below. This surface is adapted to the os cuboides. The lower surface of the bone is flat, and immediately beyond this fore-part we observe two tubercles, one internal and the other external, which give origin to muscles. The rest of this surface is concave, for lodging the flexor muscles, and rough, for the attachment of ligaments. The external side of the bone is flat, and affords a superficial groove for the tendon of the peroneus longus; the internal side is hollowed, for the lodgment of muscles, and for the safe passage of tendons, nerves, and vessels.

The os naviculare, or scaphoides, is situated between the astragalus and the ossa cuneiformia, at the inner side of the foot. Its posterior surface is concave, and adapted to the anterior head of the astragalus, and its anterior surface convex, affording three articulating surfaces, which answer to the three cuneiform bones. Of these three surfaces, the internal one is the largest. Its upper surface is convex, and affords a rough fossa. Its under surface is hollow, for the lodgment of muscles, and rough and unequal, for the attachment of ligaments. The outer side of this bone is rounded, except where it is joined, by a semi-circular smooth surface, to the os cuboides. On its inner side is observed a tuberosity, into which the tendon of the tibialis posticus is inserted.

The os cuboides is of a very irregular shape, and is placed at the outside and at the anterior part of the tarsus. Posteriorly, it is formed into an oblong articulating surface, which receives the fore-part of the os calcis. Anteriorly, it is flat, and slightly divided into two articulating surfaces, which are connected with the two last bones of the metatarsus. Its upper surface is rough and convex; its under surface is broader, and affords a considerable protuberance, on the fore-part of which is a groove for the tendon of the peronæus longus. On the inner side of the bone are two articulating surfaces, covered with cartilage; the foremost of these is flat and oblong, for its articulation with the os cuneiforme externum; the hindmost is small and semi-circular, for its articulation with the os naviculare. The external side of the bone, which helps to form the outside of the foot, is shorter and more irregular than the inner side.

The ossa cuneiformia are the three wedge-like bones, which are placed by the sides of each other between the os naviculare and the metatarsus, and which, from their situation, are usually distinguished into os cuneiforme externum, medium, and internum. They are of unequal bulk, the middle one being the smallest, and the internal one the largest. We shall give a separate description of each.

The os cuneiforme externum is of a middle size, when compared with the two others. Its upper surface forms an oblong square, and, as its sides extend obliquely downwards, a sharp edge is formed at the inside of the foot: hence the bone has the appearance of a wedge. Posteriorly, it is a little concave and nearly triangular where it joins the os naviculare; anteriorly it is nearly of the same shape, and slightly convex, for sustaining the metatarsal bone of the middle toe. Its external surface is divided into two articulating surfaces; the foremost and smallest of the two is joined to the inner side of the basis of the fourth metatarsal bone, while the other and longer surface is articulated with the os cuboides. Its inner side affords, in the same manner, two surfaces for its articulation with the os cuneiforme medium, and the outer side of the basis of the second metatarsal bone.

The os cuneiforme medium, or minimum as it is sometimes called on account of its size when compared with the other two, is wedged in between four bones. Its upper surface forms a more regular square than the last described bone. Anteriorly, it is triangular and slightly concave, for its articulation with the second metatarsal bone; posteriorly, it has a similar surface, by which it is joined to the os naviculare. Its external side is contiguous to the last described bone, and its internal side is joined to the following one.

The os cuneiforme internum, or maximum, differs from the other two in having its broad square surface placed towards the sole of the foot, where it is slightly concave, for allowing a passage to the flexors of the great toe, while its small thin edge, which appears twisted, is turned upwards. Posteriorly it is concave, and somewhat triangular, where it is joined to the os naviculare; anteriorly it is convex, and of a semi-lunar shape, for supporting the metatarsal bone of the great toe. Of its two sides the inner one is rough and convex, affording two tubercles below; the external side is flat, and consists of two smooth surfaces covered with cartilage: the direction of these two surfaces is nearly at right angles with each other; the posterior one, which is the largest, is joined to the os cuneiforme medium, while the anterior one is connected with the basis of the second metatarsal bone.

When these seven bones, which compose the tarsus, are joined together, they are convex above, where they help to form the back of the foot, and afford a concavity below, in which the tendons, vessels, and nerves of the foot are placed secure from compression. Their connections are with one another and with the bones of the metatarsus, by amphiarthrosis, except the articulation of the astragalus with the os naviculare, which is by arthrodia.

The astragalus is joined to the tibia and fibula by ginglimus, but the articulation being loose, it allows motion in every direction. All these articulations are secured by very strong ligaments.

The ligaments which collect the leg and foot are a capsular and two lateral ligaments. The capsular ligament is attached to the lower extremities of the tibia and fibula, and adheres all round the upper surface and the two lateral surfaces of the astralagus. Of the two lateral ligaments, the internal one is short and thick; it begins from the lower, and chiefly from the anterior part of the malleolus internus, and descending somewhat obliquely backwards, spreading broader as it descends, is fixed to the upper part of the inner side of the astragalus. Some of the fibres of this ligament are spread almost transversely to the back part of the malleolus internus. The whole of it is covered by a broad and thick annular ligament, which begins from the lower extremity of the malleolus internus, and spreading wider as it descends, is fixed to the inner sides of the astragalus and os calcis. This ligament serves to strengthen the articulation of the leg with the foot; but its principal use seems to be to bind down the tendons of the flexor longus pollicis, the flexor longus digitorum, and the tibialis posticus muscles, and likewise to secure the vessels and nerves in their way to the foot. The external lateral ligament is of greater length and thickness, though looser than the internal one. It begins from the anterior part of the malleolus externus, and descending obliquely backwards, is fixed to the upper and outer part of the os calcis. Besides this, many other strong fibres, which have been sometimes described as a separate ligament, are seen extending almost in a transverse direction, from the inner part of the malleolus externus to the back part of the astragalus. This external lateral ligament is likewise covered by an annular ligament, which, like the one just now described, serves rather to bind down the tendons of the foot, than to strengthen the articulation, though it is certainly useful in this latter respect. This annular ligament adheres below to the outer side of the os calcis, after which it separates into two portions; one of these extends to the lower part of the tibia, while the other is fixed to the inner side of the astralagus and os naviculare.

The bones of the tarsus are likewise firmly connected by a great number of strong ligaments, which cover their upper and under surfaces in the same manner as was observed of the bones of the carpus; and when we join the astragalus to the os calcis and os naviculare, we find an opening, which, in the recent subject, is filled up by ligaments, so that the body rests upon a yielding basis, by which means we sustain a less shock in walking or jumping.

All these bones are of a very spongy texture, covered with a compact bony lamella. Like the bones of the carpus, they are all in a cartilaginous state in the fœtus, except the astragalus and os calcis, both of which are in a great measure ossified at the ordinary time of birth; and the great tuberosity of the latter, unto which the tendo Achillis is inserted, becomes an epiphysis before it is completely united to the rest of the bone.

Tarsus, or Tarsos, a town of Cilicia, on the Cydnus, founded by Triptolemus and a colony of Argives, or, as others say, by Sardanapalus. It was once the rival of Alexandria and Athens in literature and the study of the polite arts.

TART. *a.* (ꞇeaꞃꞇ, Saxon; *taertig*, Dutch.) 1. Sour; acid; acidulated; sharp of taste. 2. Sharp; keen; severe (*Shakspeare*).

Tart. *s.* (*tarte*, French; *tarta*, Italian.) A small pie of fruit (*Bacon*).

TA'RTANE. *s.* (*tartana*, Italian.) A vessel used in the Mediterranean, with one mast and a three-cornered sail (*Addison*).

TARTAR. (*weinstein*, German.) A hard, brittle, brown-red substance, interspersed with imperfectly crystallized particles, deposited on the sides of wine-casks, during and after fermentation of the grape juice, in the form of a thick, solid crust. This is its earliest and rudest state; and in this state it is called crude or rough tartar, or argol, to distinguish it from its more purified forms, which are denominated cream of tartar, crystals of tartar, or with more precision, acidulous tartrite of potash, or supertartrite of potash.

Tartar is found to a certain extent in the must, or juice of grapes, and assists in the process of fermentation, and in the production of alkohol. It has also been found, in different combinations, in a native state, in some other vegetable juices. It is chiefly furnished, however, by wines; the more coloured and stronger bodied yielding the largest abundance. It has a vinous and slightly acid taste; and consists of a large quantity of extractive matter, scarcely soluble in water, to which it owes its colour, and of a salt, perfectly white when pure, composed of acid of tartar united to a small portion of potash, less than is required for the saturation of the acid, but which, in this proportion, forms a distinct crystallizable salt of considerable importance in several arts and manufactures.

Crude tartar is used pretty largely as a flux in the assaying of ores. As it contains both alkali and carbonaceous matter, it acts both in assisting the fusion of refractory ores, and in reducing metallic salts and oxyds. When heated *per se* to redness, in close vessels, the extractive matter and the tartareous acid both become charred, and a black alkaline carbonaceous mass is the result. In open vessels the charcoal burns off totally, and at last nothing but pure carbonat of potash remains.

But the greater part of tartar is refined to extract the pure salt, the crystals or cream of tartar, which are nearly though not exactly the same. The purification is chiefly effected by solution in boiling water, and filtration while hot. It is the mass on the surface that forms the cream, and the deposited salt that forms the crystals.

This salt attracted the peculiar attention of chemists, probably in consequence of the extravagant encomiums and invectives bestowed on it by Paracelsus. It is called tartar, says he, because it produces the oil, water, tincture, and salt, which burn the patient as hell does.

According to him, it is the principle of every disease, and every remedy, and all things contain the germ of it. This ridiculous theory was combated by Van Helmont, who gives a pretty accurate account of the formation of tartar in wine-casks. It was known to Van Helmont, and even to his predecessors, that potass could be obtained from tartar; but it was long a disputed point among chemists, whether the alkali existed in it ready-formed. Duhamel, Margraff, and Rouelle, at last established that point beyond a doubt; but the other component part of tartar was unknown, or very imperfectly known, till Scheele pointed out the method of extracting it.

The crystals of tartar are very small and irregular. According to Mantet, they are prisms, somewhat flat, and mostly with six sides. Tartar has an acid, and rather unpleasant taste. It is very brittle, and easily reduced to powder. Its specific gravity is 1.953. It is soluble in about 60 parts of cold water, and in about 30 parts of boiling water. It is not altered by exposure to the air; but when its solution in water is allowed to remain for some time, the salt is gradually decomposed, a mucous matter is deposited, and there remains in solution carbonat of potass coloured with a little oil. This decomposition was first accurately described by Berthollet in 1782.

When tartar is heated it melts, swells, blackens, and the acid is entirely decomposed. The same change takes place when the salt is distilled in close vessels. The phenomena of this distillation have been described with great care, and its products very attentively examined, by chemists; because, before the discovery of the tartaric acid by Scheele, distillation was the only method thought of for obtaining any knowledge of the acid part of tartar. These products are an enormous quantity of gass, consisting of carbonic acid and carbureted hydrogen, an oil and an acid; and, according to some chemists, carbonat of ammonia. The acid obtained was long considered as a peculiar body, and was denominated pyro-tartarous acid by the French chemists, in 1787. But Fourcroy and Vauquelin have lately demonstrated, that it is no other than acetic acid contaminated with a little empyreumatic oil.

Tartar, according to Bergman, is composed of

77 acid
23 potass
———
100.
———

Or - - - 56 tartrite of potass
44 tartaric acid
———
100.

According to the late analysis of Tenard, its component parts are

57 acid
33 potass
7 water
———
97.

Cream of tartar is a very valuable material in dyeing, and especially in dyeing scarlets: dissolved in water, it forms a cheap acidulous drink.

Tartar (Acid of). Acidum tartarosum. Sal essentiale tartari. Acidum tartari essentiale. Tartareous acid. To obtain the pure tartareous acid, take two pounds of the crystals and dissolve them in water, into which chalk is to be thrown by degrees till the liquid is saturated. A precipitate is formed, which is a true tartrite of lime, is tasteless, and cracks between the teeth. This tartrite is put into a cucurbit, and nine ounces of sulphuric acid, with five ounces of water, are poured on it. After twelve hours digestion, with occasional stirring, the tartareous acid is set at liberty in the solution, and may be cleared of the sulphate of lime by means of cold water. The virtues of this acid are antiseptic, refrigerant, diuretic. It is used in acute fevers, scurvy, and hæmorrhage.

Tartar (Emetic). See **Antimonium tartarisatum.**

Tartar (Oil of). See **Aqua kali.**

Tartar (Regenerated). See **Kali acetatum.**

Tartar (Salt of). See **Kali preparatum.**

Tartar (Soluble). See **Kali tartarisatum.**

Tartar (Spirit of). Pyro-tartareous acid. If the crystals of tartar be distilled by a strong heat, without any additional body, they furnish an empyreumatic acid, called the pyro-tartareous acid, or spirit of tartar, and a very fetid empyreumatic oil. In the retort there remains a coal which already contains a great deal of potass; but the ashes of this coal contain a still greater quantity of potass, scarcely any earth, and no neutral salts. This mild potass, when freed from its earthy particles, is generally called salt of tartar—see **Kali preparatum**; and when liquefied in the atmosphere, it forms the aqua kali of the pharmacopœias.

Tartar (Vitriolated). See **Kali vitriolatum.**

Tartar of the teeth. See **Tophus.**

TARTA'REAN. *a.* (*tartarus*, Latin.) Hellish (*Milton*).

TARTA'REOUS. *a.* (from *tartar*.) 1. Consisting of tartar (*Grew*). 2. Hellish (*Milton*).

Tartareous acid. A peculiar acid obtained from cream or crystals of tartar, and existing in a solid crystallized form. It is often called *tartaric* acid, and consequently the salts formed by its combination with earths and alkalies *tartrats* instead of *tartrites*. The former, however, appears to be the more correct term, so far as we are acquainted with its constituent principles, and under such name, therefore, we shall proceed to describe it.

Scheele was the first who obtained this acid in a separate state. He communicated his process for obtaining it to Retzius, who published it in the Stockholm Transactions for

1770. It consisted in boiling tartar with lime, and in decomposing the tartrite of lime thus formed by means of sulphuric acid.

1. The process employed at present for obtaining tartareous acid, which is the same with that of Scheele, is the following: Dissolve tartar in boiling water, and add to the solution powdered chalk till all effervescence ceases, and the liquid ceases to redden vegetable blues. Let the liquid cool, and then pass it through a filtre. A quantity of tartrat of lime (which is an insoluble white powder) remains upon the filtre. Put this tartrat, previously well washed, into a glass cucurbite, and pour on it a quantity of sulphuric acid equal to the weight of the chalk employed, which must be diluted with water. Allow it to digest for twelve hours, stirring it occasionally. The sulphuric acid displaces the tartareous; sulphat of lime remains at the bottom, while the tartareous acid is dissolved in the liquid part. Decant off this last, and try whether it contains any sulphuric acid. This is done by dropping in a little acetat of lead; a precipitate appears, which is insoluble in acetic acid if sulphuric acid is present, but soluble if it is absent. If sulphuric acid is present, the liquid must be digested again on some more tartrat of lime; if not, it is to be slowly evaporated, and about one-third part of the weight of the tartar employed is obtained of crystallized tartaric acid.

2. The form of its crystals is so irregular, that every chemist who has treated of this subject has given a different description of them. According to Bergman, they generally consist of divaricating lamellæ; according to Van Packen, they assume oftenest the form of long-pointed prisms; Spielman and Corvinus obtained them in groups, some of them lance-shaped, others needle-formed, others pyramidal. Morveau obtained them needle-form. Their specific gravity is 1.5962.

3. Crystallized tartareous acid does not experience any change in the open air, but heat decomposes it altogether: in the open fire it burns without leaving any other residuum than a spungy charcoal, which generally contains a little lime. When distilled in close vessels, it is converted into carbonic acid gass and carbureted hydrogen gass, a coloured oil, and a reddish acid liquor, which was formerly distinguished by the name of pyrotartarous acid, but which Fourcroy and Vauquelin have lately ascertained to be merely acetic acid impregnated with oil.

4. Tartareous acid dissolves readily in water. Bergman obtained a solution, the specific gravity of which was 1.230. Morveau observed, however, that crystals formed spontaneously in a solution, the specific gravity of which was 1.084. It is not liable to spontaneous decomposition when dissolved in water, unless the solution is considerably diluted.

5. Neither its action on oxygen gass nor on simple combustibles and incombustibles has been examined; but it is probable that it is not capable of producing any sensible change on them. It is capable of oxydizing iron and zinc, and even mercury; but it does not act upon antimony, bismuth, tin, lead, copper, silver, gold, or platinum. Its action on the other metallic bodies has scarcely been examined.

6. It combines with alkalies, earths, and metallic oxyds, and forms salts known by the name of tartrites.

7. The action of the greater part of the other acids on it is unknown. Hermstadt has ascertained that it may be converted into oxalic acid by distilling it repeatedly with six times its weight of nitric acid. By this process he obtained 560 parts of oxalic acid from 360 parts of tartaric acid.

8. From this result, and from the products obtained when tartareous acid is distilled, it is evident that it is composed of oxygen, carbon, and hydrogen. Fourcroy informs us that Vauquelin and he have ascertained that these ingredients are combined in it in the following proportions:

70.5 oxygen
19.0 carbon
10.5 hydrogen
———
100.0

9. The affinities of this acid follow the same order as those of oxalic acid.

Tartareous acid, in a state of purity, has scarcely been put to any use; but some of the compounds into which it enters are much employed in medicine. This acid has the property of combining in two different proportions with a great number of bases. With potass, for instance, in one proportion, it forms a salt pretty soluble in water, called tartrite of potass; but when added in a greater proportion, it forms tartar, a salt very imperfectly soluble in water. By this property the presence of tartareous acid, in any acid solution, may easily be detected. All that is necessary is, to drop in slowly a little solution of potass; if tartareous acid is present, tartar immediately precipitates in the form of a white gritty powder.

To **TARTARI'ZE.** *v. a.* (from *tartar.*) To impregnate with tartar.

TA'RTAROUS. *a.* (from *tartar.*) Containing tartar; consisting of tartar.

TARTARUS AMMONIÆ. See TARTRIS AMMONIACÆ.

TARTARUS CHALYBEATUS. See TARTRIS POTASSÆ ACIDULUS FERRATUS.

TARTARUS, one of the regions of hell, where the most impious and guilty among mankind were punished. According to Hesiod it was a separate prison, at a greater distance from the earth than the earth is from the heavens.

TARTARY, or TATARY, a country of Asia, which, taken in its utmost limits, reaches from the Eastern Ocean to the Caspian Sea, and from Corea, China, Thibet, Hindustan, and Persia, to Russia and Siberia. It lies between 55 and 135° E. lon. and between 35 and 55° N. lat. being 3600 miles in length and

960 in breadth; but in the narrowest part not above 330 broad. It may be considered under two grand divisions; namely, Eastern and Western Tartary. The greatest part of the former either belongs to the emperor of China, is tributary to him, or is under his protection; and a very considerable part of Western Tartary has been conquered by the Russians. These vast countries include all the middle part of Asia, and are inhabited by Tartars of different denominations and different manners. For various particulars concerning them, see the articles Abkhas, Circassia, Crimea, Cossacks, Georgia, Imeritia, Kalmucs, Kisti, Lesguis, Mantchews, Mingrelia, Moguls, Ossi, Samovedes, Turcomans, and Usbecs.

TARTARY (Krim). See CRIMEA.

TARTINI (Joseph), a musician, called the admirable by Dr. Burney, was born April 1692, at Pirano in Istria. He studied the law at Padua, but his powers were formed for musical eminence, and by practice and application he became one of the best performers on the violin, and was made master of the band in the church of St. Antony of Padua. He died 26th February, 1770, at Padua, universally respected and endeared to the inhabitants by a residence of 50 years. He wrote sonatas, a treatise on music 1754, and other things, and was a great admirer of Corelli.

TA'RTLY. *ad.* (from *tart.*) 1. Sharply; sourly; with acidity. 2. Sharply; with poignancy; with severity (*Walker*). 3. With sourness of aspect (*Shakspeare*).

TA'RTNESS. *s.* (from *tart.*) 1. Sharpness; sourness; acidity (*Mortimer*). 2. Sourness of temper; poignancy of language (*Sh.*).

TARTON-RAIRE, in botany. See DAPHNE.

TARTRIS AMMONIACÆ. Alkali volatile tartarisatum of Bergman. Sal ammoniacum tartareum. Tartarus ammoniæ. The virtues of the tartrite of ammoniac are diaphoretic, diuretic, and deobstruent. It is prescribed in fevers, atonic exanthemata, catarrh, arthritic and rheumatic arthrodynia, hysteric spasms, &c.

TARTRIS POTASSÆ. See KALI TARTARISATUM.

TARTRIS POTASSÆ ACIDULUS. See CREMOR TARTARI.

TARTRIS POTASSÆ ACIDULUS FERRATUS. Globuli martiales. Tartarus chalybeatus. Mars solubilis. Ferrum potabile. Its virtues are adstringent. It is principally used externally in the form of fomentation or bath in contusions, distortions, and luxations.

TARTRIS POTASSÆ ACIDULUS STIBIATUS. See ANTIMONIUM TARTARISATUM.

TARTRIS SODÆ. Sal polychrestus Seignetti. Sal rupellensis. Alkali minerale tartarisatum. This preparation is commonly supposed to be a triple salt, though only composed of the tartareous acid and soda; and therefore called tartris sodæ in the new chemical nomenclature. In a large dose it proves cathartic, in a lesser, diuretic and deobstruent; and is given against saburra of the primæ viæ, obstipation, and in the cure of agues, and abdominal physconia.

TARTRITES. Salts formed with the tartareous acid, and consisting of the following forms.

1. Supertartrite of potash. Cream of tartar, for which see TARTAR.

2. Tartrite of potash. Soluble tartar. KALI TARTARISATUM, which see.

3. Tartrite of potash and soda. Salt of Seignetti.

4. Tartrite of potash and ammonia.

5. Tartrite of potash and lime. Tartrite of baryte, &c.

6. Tartrite of soda. Nearly the same as the tartrite of potash and soda: both of which are called Rochelle salts, though the former more correctly so.

7. Supertartrite of soda; formed by partially saturating tartareous acid with soda.

TASK. *s.* (*tasche*, French; *tassa*, Italian.) 1. Something to be done imposed by another (*Milton*). 2. Employment; business (*Atterbury*). 3. *To take to* TASK. To reprove; to reprimand (*Addison*).

To TASK. *v. n.* (from the noun.) To burden with something to be done (*Shakspeare*).

TA'SKER. TA'SKMASTER. *s.* (*task* and *master.*) One who imposes tasks (*Milton. Dryden*).

TASSASUDON, the capital of Bootan, a feudatory country of Tibet. The castle, or palace, is an extensive quadrangular building of stone, with accommodation for the raja, or lama, all the officers of state, a very numerous establishment of Gylongs, and a temple of the great idol Mahamoonie. It is seated on the Tehintchieu, in a well cultivated valley, surrounded by mountains, 280 miles S.S.W. of Lassa. Lon. 89. 40 E. Lat. 27. 49 N.

TA'SSEL. *s.* (*tasse*, French.) An ornamental bunch of silk, or glittering substances (*Spenser*).

TA'SSEL. TA'ZEL. *s.* An herb. See TEAZLE (*Ainsworth*).

TA'SSELED. *a.* (from *tassel.*) Adorned with tassels (*Milton*).

TA'SSES. *s.* Armour for the thighs (*Ainsworth*).

TASSING, an island of Denmark, between Funen and Langeland, separated from the former by a strait. It is 18 miles in circuit, and has a town of the same name. Lon. 10. 47 E. Lat. 55. 7 N.

TASSO (Bernardo), is known as the father of the illustrious Tasso. The best of his poems is Amadis, in 100 cantos; and his letters also are regarded as very valuable by the Italians. He died at Rome 1575.

TASSO (Torquato), a celebrated poet, son of the above. He was born at Sorrento, in the kingdom of Naples, 11th March, 1544. His father was secretary to Severino, prince of Salerno, and he shared his honour and his disgrace. When the prince made a complaint to Charles V. against the viceroy of Naples, who wished to introduce the inquisition into the kingdom, he was condemned, and the sentence was pronounced not only against him, but against his secretary, and also his son only nine years old. They fled to Rome, where the young poet already wrote verses, and compared his escape to the adventures of Ascanius and Æneas flying from Troy. From Rome he was sent to Padua to study the law, but poetry was his favourite pursuit, and at seventeen he produced his Rinaldo. In 1565, he placed himself under the protection of Alphonso of Ferrara, and accompanied his brother, the cardinal, in an embassy from Gregory XIII. to Charles IX. of France. On his return to Ferrara he imprudently became enamoured of the sister of his patron, and this passion proved the cause of that melancholy which embittered his life for 20 years. To fly from his misery he retired to his sister's house at Sorrento, but absence increased his flame. He returned to Ferrara, and in the midst of a crowded assembly he imprudently embraced his favourite Eleonora. The duke, who was present, with great coolness ordered his courtiers to remove the poet, whom he pronounced insane, to a place of confinement, and there, in the hospital of St. Anne, the lover mourned his misfortunes, a prey to disease, and at intervals deprived of his reason. The interference of Gonzaga at last restored him to liberty 1586, and he retired to Naples. His great merits now eclipsed the clouds which envy and malice had raised around him, and his poetical works began to be regarded as the glory of Italy. Sensible of his reputation, Clement VIII. determined to encircle his brows with the laurel crown, and to honour him with a triumph. The poet was sent for from Naples, and the most magnificent preparations were made for the ceremony in the capital. Vain, however, are the schemes of man: Tasso, as if persecuted by fortune to the last moment of his life, was taken ill, and the preparations made for his coronation ended in the melancholy procession of his funeral, as he died the evening before the intended ceremony, 15th April, 1595, aged 51. He derives his celebrity from his Jerusalem delivered, a poem well conducted throughout, and abounding with all the pleasing description of tender scenes, the animated representation of battles, and the majestic flow of language which so much captivate and overpower the reader in the pages of Homer and Virgil. Besides his Jerusalem, which is familiar to the English reader in the elegant translation of Mr. Hoole and Miss Watts, Tasso wrote Jerusalem conquered; Rinaldo; Aminta, a pastoral; Torismond, a tragedy, &c. Very interesting memoirs of the life and productions of Tasso have been recently published by Mr. Black.

TA'STABLE. *a.* That may be tasted; savoury; relishing (*Boyle*).

To TASTE. *v. a.* (*taster*, to try, French.) 1. To perceive and distinguish by the palate (*John*). 2. To try by the mouth; to eat at least in a small quantity (*Milton*). 3. To essay first (*Dryden*). 4. To obtain pleasure from (*Carew*). 5. To feel; to have perception of (*Hebrews*). 6. To relish intellectually; to approve (*Milton*).

To TASTE. *v. n.* 1. To try by the mouth; to eat (*Milton*). 2. To have a smack; to produce on the palate a particular sensation (*Bacon*). 3. To distinguish intellectually (*Swift*). 4. To be tinctured, or receive some quality or character (*Shakspeare*). 5. To try the relish of any thing (*Davies*). 6. To have perception of (*Wisdom*). 7. To take to be enjoyed (*Milton*). 8. To enjoy sparingly (*Dryden*).

TASTE. *s.* (from the verb.) 1. The act of tasting; gustation (*Milton*). 2. The sense by which the relish of any thing on the palate is perceived (*Bacon*). 3. Sensibility; perception (*Shakspeare*). 4. That sensation which all things taken into the mouth give particularly to the tongue (*Locke*). 5. Intellectual relish or discernment (*Pope*). 6. An essay; a trial: not in use (*Shakspeare*). 7. A small portion given as a specimen (*Bacon*).

TASTE. The organ of taste differs but slightly from that of touch. It appears, by certain experiments, to be seated in the tongue chiefly; for neither does sugar, applied to any other part of the mouth, excite the least sense of taste in the mind, nor any other sapid body, unless it contain something vehemently penetrating; in which case the palate, root of the tongue, uvula, and even the œsophagus, are affected by the sapid acrimony. That sensation which is sometimes excited in the stomach, œsophagus and fauces, by the regurgitation of the aliments, seems also to belong to the tongue, to which the sapid vapours are applied.

Only the upper surface and lateral edges of the tongue are fitted by nature to exercise the sense of taste. By the tongue we understand a muscular body lodged in the mouth, obtuse, very broad in man, and divided in the middle by an obscure sulcus. Its posterior and lower parts are variously connected to the adjacent bones and muscles; its anterior and upper parts are moveable. In that portion which constitutes the organ of taste, the skin, continuous with that of the face and mouth, adheres to the muscular flesh, but is pulpy and soft, from the perpetual warmth and moisture.

From this skin arise innumerable nervous papillæ, of a more considerable size here than in other parts. Of these there are several kinds; the first kind consists of nine or ten at the back part of the tongue, disposed in a line on each side of the foramen cæcum. These, surrounded by a circular groove, for the most part resemble an inverted cone, and have a deep sinus in their middle; but are otherwise hard, and but indifferently adapted for tasting, although you can easily trace nerves into them. There are some other papillæ of the same kind found scattered before these upon the back of the tongue. These degenerate into the fungiform class of papillæ, which are found distributed over the upper surface of the tongue, less and slenderer than the former, always becoming more pointed as they proceed forwards, till around the edges of the tongue they are crowded together, and disposed in diverging ines. The third sort of papillæ are conical. These are by far the most numerous, are dispersed among the former; and are spread copiously over the tongue. The most anterior of them in the apex of the tongue are more inclined and fluctuate; they are most remarkably numerous in the edges of the tongue; there are even some behind the foramen cæcum. They are highly sensible, and constitute the true organ of taste; other papillæ are intermixed, partly conical, and partly filiform; and of the conical ones some are larger, and others successively smaller.

These papillæ, besides numerous vessels, are supplied with nerves, which may be traced into the larger papillæ, and with which the tongue is more largely supplied than almost any other part. For besides a nerve of the eighth pair, which, with one of its principal three branches, enters deeply into the basis of the tongue, covered by the cerato-glossus, near the os hyoides; there is also a considerable nerve that goes to the muscles of the tongue from the ninth pair, which having inosculated with the first nerve of the neck, and with the large cervical ganglion, and having sent a branch downwards, often uniting with the eighth pair, and constantly with the second and third of the neck, and supplying the muscles arising from the sternum, and frequently communicating with the phrenic nerve, proceeds with the rest of its trunk to the tongue. This communicates in the cerato-glossus, by many branches, with the fifth pair, and is chiefly spent upon the genio-glossus. Lastly, the third branch of the fifth pair having sent upwards or received the cord of the tympanum, and given other branches to the internal pterygoid, and biventer; to the maxillary gland, forming with these a ganglion; to the sublingual gland, and crossing, with its principal trunk, the cerato-glossus, where it is united with the ninth pair, comes to the tongue, in company with the deep seated artery, with which it penetrates to the tip of the tongue, where it becomes cutaneous. To this nerve, therefore, if there be any preference, the sense of taste is to be especially ascribed, which is even confirmed by morbid examples. Lastly, the papillæ of the tongue are of a hard texture; a firm, pulpy, cellular substance uniting the arteries, veins, and nerves, into masses, of which many compose one large papilla.

The arterial and venous villi which run between the papillæ are for the purposes of exhalation and inhalation, and have nothing to do with taste, farther than that they separate from the blood a liquor proper for dissolving salts, and for keeping moist the papillæ, which they pour out on the back of the tongue. On the upper and back part of the tongue are seated many simple muciferous glands, opening by one or more outlets, and of a round shape, formed by an hemispherical membrane and the fleshy part of the tongue. Some of these open into an obscure blind cavity, of an uncertain figure, which is placed in the middle of the largest papillæ; and commonly contains some of them.

The papillæ of the human tongue are covered only by a mucous, semi-pellucid membrane, which adheres closely to them, and serves them as a cuticle. But, in animals, a perforated net-work receives the papillæ, which enter into hollow cornuted sheaths.

Under the papillæ lies the muscular substance of the tongue, composed of various muscles, but in man hardly extricable. The lower part is in a great measure made up of the genio-glossus muscle extended outwards from the commissure of the chin, and distributed like rays upon the tongue. The upper and lateral parts are composed of the stylo-glossus, whose fibres run to the tip of the tongue. Its middle part, between these, is composed of the proper lingual muscle, which arising from itself before the pharynx, and from the stylo-glossus, but deeper, proceeding forwards, is terminated there, and in the genio-glossus muscle, and between that and the stylo-glossus, constitutes a considerable part of the tongue. The back part is formed by the cerato-glossus, of which the fibres ascend upwards and backwards, and which is included between the stylo-glossus and lingualis, and by the chondro-glossus, an entirely different muscle, which arises from the small bones of the os hyoides and the nearest part of its basis, from whence passing outwards, covered by lateral layers of the genio-glossus, and joining the stylo-glossus, it disappears in the tongue. By the action of these muscles, the whole tongue is moveable in all directions, and is capable of varying its own figure, becoming concave when elevated by the stylo-glossi, being again flattened by the cerato-glossi, being rendered narrow, and almost cylindrical, by the transverse fibres of the tongue; besides which there are other organs in the human tongue inextricable and intermixed with much tenacious fat.

The arteries of the tongue are numerous. The largest, which is deep seated and serpentine, comes from the external carotid, and extends along the lower part to the tip of the tongue; a smaller superficial artery, incumbent on the sublingual gland, and inosculating with the preceding, arises either from it or from the labial. Other small posterior arteries arise either from branches of the labial, or from the tonsillaris. The veins of the tongue are variously intricated, and difficult to describe; one, lying deep, accompanies the nerve of the ninth pair; another, superficial, accompanies the mental artery, and, inosculating with the former, forms the ranular vein; but all of them tend towards that large vein, which is a different branch of the internal jugular, from the cerebral one. They variously communicate with the adjacent tonsillary, thyroid, pharyngeal, and cutaneous plexuses; and on the back of the tongue, before the epiglottis, those of the right and left sides are interwoven with each other. Lymphatic vessels are found rather in the neighbourhood of the tongue, than in the tongue itself.

The papillæ of the tongue being larger and softer than those of the skin, and perpetually moist, perform the office of touch more exquisitely than those of the skin, which are dry and small; hence the tongue suffers more acute pain: moreover, the cutaneous papillæ receive no other sensations from salts than those of moisture or pain. But the papillæ of the tongue being erected and somewhat protuberant, to perform the office of taste, are affected in such a manner by salts dissolved in water, or saliva, and applied to their summits, that the mind distinguishes certain classes of tastes, as sour, sweet, rough, bitter, salt, urinous, spirituous, aromatic, pungent of various kinds, insipid, putrid, and others partly purely saline, and partly changed, and compounded by the admixture of subtile animal or vegetable oils. All very acrid salts excite pain instead of taste. Does the diversity of flavours arise from the different figures of the salts? Does this appear from the cubical figure of sea salt, the prismatical figure of nitre, or the particular configuration of vitriol, sugar, &c.? It does not seem probable, for even insipid crystals have their particular figures; and in salts very different in taste and other properties, the figures are too much the same, and again are inconstant in the same salt, as for example, in nitre, which may by art be rendered cubical. The cause of tastes seems therefore to reside in the internal structure of the elements, not perceptible by our senses.

But the nature of the covering of the papillæ, of the saliva, of the fluids, and of the aliments lodged in the stomach, have great influence on the perception of tastes; insomuch, that the same flavours do not affect all ages alike, nor all temperatures; nor even the same person, according as he may be in health, diseased, or habituated to it. In general, whatever contains less salt than the saliva does seems insipid.

The spirituous parts, more especially of vegetables, are received either into the papillæ themselves, or into the absorbing villi of the tongue; as appears from the speedy renovation of strength by liquors of this kind, even when they are not taken into the stomach.

Nature designed the diversity of flavours, that animals might know those things most proper for their food; for in general there is no aliment unhealthy that is of an agreeable taste; nor is any thing ill tasted that is fit for the food of man. We here take no notice of excess, by which the most healthy food may become prejudicial, or of minerals, which are not furnished by nature, but prepared by art. Thus nature has invited man to take the food necessary for his subsistence, both by the pain called hunger, and by the pleasure arising from taste. But animals, which do not learn from example and the instruction of others, distinguish flavours more accurately, and, admonished by that test, abstain cautiously from unhealthy food; and, therefore, herbivorous animals especially, to which a very great diversity of aliments mixed with noxious plants are offered, are furnished with such long papillæ, and so elegant a structure of the tongue, for which man has less occasion.

TASTE is used in a figurative sense, to denote that faculty of the mind by which we perceive and enjoy whatever is beautiful or sublime in the works of nature or of art. Like the taste of the palate, this faculty relishes some things, is disgusted with others, and to many is indifferent; and from these obvious analogies between it and the external sense, it has obtained its name. It has likewise been called an internal sense, and by Dr. Hutcheson, a reflex sense; whilst others have considered it, not as a distinct faculty or sense, but as the joint exertion of perception and judgment in some cases, and as a play of the imagination in others.

The reader who wishes for instruction in the philosphy of taste may consult Gerard's Essay on Taste, with the dissertations of Voltaire, d'Alembert, and Montesquieu; Dr. Blair's Lectures on the Belles Lettres; Dr. Reid's Essays on the Intellectual Powers of Man; Alison's Essays on the Nature and Principles of Taste; sir Joshua Reynolds's Discourses delivered in the Royal Academy; and professor Dugald Stewart's Essays.

TA'STED. *a.* (from *taste.*) Having a particular relish (*Bacon*).

TA'STER. *s.* (*tasteur*, French.) 1. One who takes the first essay of food (*Dryden*). 2. A dram cup (*Ainsworth*).

TA'STEFUL. *a.* (*taste* and *full.*) High relished; savoury (*Pope*).

TA'STELESS. *a.* (from *taste.*) 1. Having no power of perceiving taste. 2. Having no relish or power of stimulating the palate; insipid (*Boyle*). 3. Having no power of giving pleasure; insipid (*Rogers*). 4. Having no intellectual gust.

TA'STELESSNESS. *s.* (from *tasteless.*) 1. Insipidity; want of relish. 2. Want of perception of taste. 3. Want of intellectual relish.

TATE (Nahum), a native of Dublin, born 1652, and educated at the college there. He was befriended by Dryden and Dorset, and succeeded Shadwell as poet laureat, with a salary of 100*l.* per annum and a butt of canary. He wrote nine dramatic pieces, and he is now known as the joint translator of the psalms with Brady. Of his miscellaneous poems, that on the death of queen Anne was most admired. He died at the mint, where he resided to escape his creditors.

TATIAN, a writer of the primitive church in the second century. He was born in Assyria, and trained up in the heathen religion and learning. Coming over to Christianity, he became the disciple of Justin Martyr, whom he attended to Rome. While Justin lived, he continued steadily orthodox: but after Justin's death he made a schism, and became the author of a new sect, condemning marriage, enjoining abstinence from wine and animal food, and suffering only water to be used in the holy mysteries; whence his followers were called Encratitæ and Hydroparostatæ. None of his works are now extant but his piece against the Gentiles; or, as it is usually entitled, his Oration to the Greeks.

TATIUS (Titus), king of Cures, among the Sabines, made war against the Romans after the rape of the Sabines. The gates of the city were betrayed into his hands by Tarpeia, and the army of the Sabines advanced as far as the Roman forum, where a bloody battle was fought. The cries of the Sabine virgins at last stopped the fury of the combatants, and an agreement was made between the two nations. Tatius consented to leave his ancient possessions, and, with his subjects, to come and live in Rome. He shared the royal authority with Romulus, and lived in the greatest union. He was murdered about six years after, at Lanuvium, B. C. 742, for an act of cruelty to the ambassadors of the Laurentes.

TATTA, a city of Hindustan, capital of the province of Sindy. It is seated on a branch of the river Sinde or Indus, called the Richtel River. In the 17th century it was very extensive and populous, possessing manufactures of silk, wool, and cotton; and it was celebrated for its cabinet ware. Little of those now remain, and the limits of the city are very circumscribed. On the shores of the Indus, above the Delta, considerable quantities of saltpetre are made; and within the hilly tract, which commences within three miles on the N.W. of Tatta, are mines of iron and salt. The Indus and its branches admit of an uninterrupted navigation from Tatta to Moultan, Lahore, and Cashmere, for vessels of near 200 tons; and a very extensive trade was carried on between those places, in the time of Aurungzebe; but at present very little of this trade remains, owing to a bad government in Sindy, and to a hostile disposition of the Seiks, the present possessors of Moultan and Lahore. Tatta is 280 miles W.N.W. of Amedabad, and 390 S.S.W. of Moultan. Lon 67. 37 E. Lat. 24. 50 N.

To TA'TTER. *v. a* (ꞇoꞇæꞃan, Saxon.) To tear; to rend; to make ragged (*Pope*).

TA'TTER. *s.* (from the verb.) A rag; a fluttering rag (*L'Estrange*).

TATTERDEMA'LION. *s.* A ragged fellow.

TATTERSHALL, a town in Lincolnshire, with a market on Friday. It was formerly of note for its castle, and is seated on the Bane, near its confluence with the Witham, 20 miles S.E. of Lincoln, and 127 N. of London. Lon. 0. 8 W. Lat. 53. 6 N.

To TA'TTLE. *v. n.* (*tateren*, Dutch.) To prate; to talk idly (*Addison*).

TA'TTLE. *s.* (from the verb.) Prate; idle chat; trifling talk (*Watts*).

TA'TTLER. *s.* (from *tattle.*) An idle talker; a prater (*Taylor*).

TA'TTOO. *s.* The beat of drum, by which soldiers are warned to their quarters (*Prior*).

TATTOOING, or TATTOWING, an operation in use among the islanders in the South Sea, for marking their bodies with figures of various kinds, which they consider as ornamental. It is effected by puncturing the skin with an instrument somewhat resembling a comb, and rubbing a substance of a black colour into the wounds.

TAUCHEL, a town of Poland, in Pomerelia, seated on the Verd, 30 miles N.W. of Culm, and 55 S.W. of Marienburg. Lon. 18. 5 E. Lat. 53. 38 N.

TAVERNA, a town of Naples, in Calabria Ulteriore, seated on the Coraca, 20 miles E. of Nicastro, and 70 N.E. of Reggio. Lon. 16. 44 E. Lat. 39. 11 N.

TA'VERN. *s.* (*taverne*, French; *taberna*, Latin.) A house where wine is sold, and drinkers are entertained (*Shakspeare*).

TA'VERNER. TA'VERNKEEPER. TA'VERNMAN. *s.* (from *tavern*, *man*, or *keep*; *tavernier*, French.) One who keeps a tavern (*Camden*).

TAVERNIER (John Baptist), a famous French traveller, was born in 1605. In the course of forty years he travelled six times to Turkey, Persia, and the East Indies, and visited all the countries in Europe, travelling mostly on foot. His travels have been frequently reprinted in 6 vols. 12mo. He died on his seventh journey to the east, at Moscow, in 1609.

TAUGHT. The pret. and part. pass. of *teach*.

TAVIRA, or TAVILA, a considerable town of Portugal, capital of Algarva, with a castle, and one of the best harbours in the kingdom, defended by a fort. It is seated in a fertile country, at the mouth of the Gilaon, between cape Vincent and the straits of Gibraltar, 100 miles W. by N. of Cadiz. Lon. 7. 46 W. Lat. 37. 18 N.

TAVISTOCK, a borough in Devonshire, with a market on Saturday. It is seated on the river Tavy, and was once famous for a stately abbey, now divided into tenements. It sends two members to parliament, and gives the title of marquis to the eldest son of the duke of Bedford. It has a brook running through every street, and a stone bridge of five arches over the river. It is 32 miles W. by S. of Exeter, and 206 of London. Lon. 4. 12 W. Lat. 50. 35 N.

To TAUNT. *v. a.* (*tanser*, French; *tanden*, Dutch, to show teeth.) 1. To reproach; to insult; to revile; to ridicule (*Rowe*). 2. To exprobrate; to mention with upbraiding (*Shakspeare*).

TAUNT. *s.* (from the verb.) Insult; scoff; reproach; ridicule (*Prior*).

TA'UNTER. *s.* (from *taunt.*) One who taunts, reproaches, or insults.

TA'UNTINGLY. *ad.* (from *taunting.*) With insult; scoffingly; with contumely and exprobration (*Shakspeare*).

TAUNTON, a borough in Somersetshire, governed by a mayor, with a market on Wednesday and Saturday. It is situate in an extensive and fertile valley, called Taunton Dean, on the river Tone, which is navigable hence to the Parret. It has a large manufacture of silk, and a considerable one of woollen goods, such as serges, duroys, druggets, &c. It had once a strong castle, now in ruins; and is a well-built place, with spacious streets and two churches. The number of inhabitants in 1801 was 5794. The spring assizes are held here. Taunton was the scene of many bloody executions, in the reign of James II. after the defeat of the duke of Monmouth, at Sedgemoor, near this town. It is 31 miles N.E. of Exeter, and 141 W. by S. of London. Lon. 3. 17 W. Lat. 50. 59 N.

TAURI, a people of European Sarmatia, who inhabited Taurica Chersonesus. They sacrificed all strangers to Diana.

TAURICA CHERSONESUS, a large peninsula of Europe, at the south west of the Palus Mæotis, now called the Crimea. The inhabitants, called Tauri, were a savage and uncivilized nation. See TAURI.

TAURICA, a sirname of Diana, because she was worshipped by the inhabitants of Taurica Chersonesus.

TAURICO'RNOUS. *a.* (*taurus* and *cornu*, Lat.) Having horns like a bull (*Brown*).

TAURIS, or TABRIS, a city of Persia, capital of Aderbeitzan, and formerly the capital of Persia. It is of an irregular figure, and has neither walls nor fortifications. The river Spingtcha flows through it, and the Agi passes on the N. side of the city. Here are many magnificent structures. The bazars, from their largeness, the beautiful domes with which they are covered, and the merchandise with which they are filled, make as fine an appearance as any in Asia. There are 300 caravansaries, which are so spacious that 300 persons may lodge in each; and the mosques and baths are equal to the grandeur of the other buildings. Tauris has a prodigious trade in cotton, cloth, silks, gold and silver brocades, fine turbans, and shagreen leather. In 1724, it was terribly shaken by an earthquake, and nearly 100,000 persons perished. Soon after this calamity the Turks laid siege to it, and they were drove away with great loss; but they took it the next year after a bloody contest, in which the Persians lost 30,000 men, and the Turks 20,000. It is seated in a fertile plain, at the foot of a mountain, 95 miles S.E. of Naksivan, and 320 N.W. of Ispahan. Lon. 48. 0 E. Lat. 38. 28 N.

TAUROMINIUM, a town of Sicily, between Messana and Catana, built by the Zancleans, Sicilians, and Hybleans, in the age of Dionysius, the tyrant of Syracuse. The hills in the neighbourhood were famous for the fine grapes which they produced.

TAURUS, the largest mountain of Asia as to extent. It extends as far as the most eastern extremities of Asia, branches in several parts, and runs far in the north. Mount Taurus was known by several names, particularly in different countries. It was called Taurus Amanus, from the bay of Issus as far as the Euphrates; Antitaurus from the western boundaries of Cilicia up to Armenia; Caucasus between the Hyrcanian and Euxine sea, &c. The word Taurus was more properly confined to the mountains that separate Phrygia and Pamphylia from Cilicia. The several passes in it were called Pylæ, and hence frequent mention is made in ancient authors of the Armenian Pylæ, Cicilian Pylæ, &c.

TAURUS, the bull, in zoology. See BOS.

TAURUS, in astronomy, the bull; one of the twelve signs of the zodiac, and the second in order.

The stars in the constellation Taurus, in Ptolemy's catalogue, are 44; in Tycho's catalogue 43; in Hevelius's catalogue 51; in the Britannic catalogue 141. Of which, however, not one is of the first magnitude.

TAUTOLO'GICAL. *a.* (from *tautology.*) Repeating the same thing.

TAUTO'LOGIST. *s.* (from *tautology.*) One who repeats tediously.

TAUTO'LOGY. *s.* (ταυτολογια.) Repetition of the same words, or of the same sense in different words (*Addison*).

To TAW. *v. a.* (*touwen*, Dutch; ꞇapian, Saxon.) To dress white leather, commonly called alum leather, in contradistinction from *tan* leather, that which is dressed with bark.

TAW. *s.* A marble to play with (*Swift*).

TA'WDRINESS. *s.* Tinsel finery; finery ostentatious without elegance (*Clarissa*).

TA'WDRY. *a.* Meanly showy; splendid without cost; fine without grace; showy without elegance (*Addison*).

TA'WDRY. *s.* A slight ornament (*Drayton*).

TA'WER. *s.* (from *taw.*) A dresser of white leather.

TAW'NG, the art of dressing skins in white, so as to be fit for divers manufactures, particularly gloves, &c. All skins may be tawed; but those chiefly used for this purpose are lambs, sheep, kids, and goat skins. See LEATHER.

TA'WNY. *a.* (*tane*, *tanné*, Fr.) Yellow, like things tanned (*Peacham*).

TAX. *s.* 1. An impost; a tribute imposed; an excise; a tallage (*Arbuthnot*). 2. (*taxo*, Lat.) Charge; censure (*Clarendon*).

To TAX. *v. a.* (*taxer*, Fr. from the noun.) 1. To load with imposts (*Kings*). 2. To charge; to censure; to accuse (*Raleigh*).

TAX. (*taxa*, from the Greek ταξις, i. e. *ordo*, *tributum*.) A tribute or imposition laid upon the subject for the support of government. See REVENUE. It is the ancient indisputable privilege and right of the House of Commons, that all grants of subsidies or parliamentary aids do begin in their house, and are first bestowed by them; although their grants are not effectual to all intents and purposes until they have the assent of the other two branches of the legislature. See COMMONS. The general reason given for this exclusive privilege of the House of Commons is, that the supplies are raised upon the body of the people, and therefore it is proper that they alone should have the right of taxing themselves. This reason would be unanswerable, if the Commons taxed none but themselves: but it is notorious, that a very large share of property is in the possession of the House of Lords; that this property is equally taxable, and taxed, as the property of the Commons: and therefore the Commons, not being the sole persons taxed, this cannot be the reason of their having the sole right of raising and modelling the supply. The true reason, arising from the spirit of our constitution, seems to be this. The Lords being a permanent hereditary body, created at pleasure by the king, are supposed more liable to be influenced by the crown, and when once influenced to continue so, than the Commons, who are a temporary elective body, freely nominated by the people. It would therefore be extremely dangerous to give the Lords any power of framing new taxes for the subject; it is sufficient that they have a power of rejecting, if they think the Commons too lavish or improvident in their grants. But so reasonably jealous are the Commons of this valuable privilege, that herein they will not suffer the other house to exert any power but that of rejecting. They will not permit the least alteration or amendment to be made by the Lords to the mode of taxing the people by a money-bill: under which appellation are included all bills by which money is directed to be raised upon the subject, for any purpose or in any shape whatsoever; either for the exigencies of government, and collected from the kingdom in general, as the land-tax; or for private benefit, and collected in any particular district, as by turnpikes, parish-rates, and the like. Yet sir Matthew Hale mentions one case, founded on the practice of parliament in the reign of Henry VI. wherein he thinks the Lords may alter a money-bill: and that is, if the Commons grant a tax, as that of tonnage and poundage, for four years; and the Lords alter it to a less time, as for two years: here, he says, the bill need not be sent back to the Commons for their concurrence, but may receive the royal assent without farther ceremony; for the alteration of the Lords is consistent with the grant of the Commons. But such an experiment will hardly be repeated by the Lords, under the present improved idea of the privilege of the House of Commons; and, in any case where a money-bill is remanded to the Commons, all amendments in the mode of taxation are sure to be rejected.

The Commons, when they have voted a supply to his majesty, and settled the quantum of that supply, usually resolve themselves into what is called a committee of ways and means, to consider the ways and means of raising the supply so voted. And in this committee every member (though it is looked upon as the peculiar province of the chancellor of the exchequer) may propose such schemes of taxation as he thinks will be least detrimental to the public. The resolutions of this committee (when approved by a vote of the house) are in general esteemed to be (as it were) final and conclusive.

The following was the net produce of the taxes in the year ending the 5th of January 1808, of all the permanent taxes existing before 1803, and of the taxes imposed in each year since.

	£.	s.	d.
Customs - - -	3,153,495	1	7
Excise - - - -	14,367,912	0	0
Stamps - - -	3,055,781	9	5
Incidents - - -	5,932,389	1	6¾
Duties imposed in 1803 -	310,053	10	3
Ditto ——— 1804 -	1,093,582	3	4
Ditto ——— 1805 -	1,154,015	5	2¾
Ditto ——— 1806 -	823,261	7	9
Duties on sugar, malt, tobacco - - - -	4,361,326	8	0½
	£34,251,816	7	2

See Debt, Expenditure, Funds, Revenue, &c.

TA′XABLE. *a.* That may be taxed.

TA′XATION. *s.* (*taxation*, French.) 1. The act of loading with taxes; impost; tax (*Sidney*). 2. Accusation; scandal (*Shakspeare*).

TA′XER. *s.* (from *tax*.) He who taxes (*Bacon*).

TAXIS. An operation, by which those parts which have quitted their natural situation are replaced by the hand without the assistance of instruments, as in reducing hernias, &c.

TAXUS. Yew-tree. In botany, a genus of the class diœcia, order monadelphia. Male: calyxless; corolless; stamens numerous; anthers peltate, eight-cleft. Female: calyx cup-shaped, entire; styleless; seed one, imbedded in the berried calyx. Five species, of which the only one cultivated is taxus baccata, a native of Europe, and found wild in our own country. Leaves linear, approximate, male receptacles nearly globular. It is easily propagated by sowing the berries in autumn, as soon as they are ripe, upon a shady bed of fresh, undunged soil, covering them over about half an inch thick with the same earth. In the spring the bed should be carefully cleared from weeds, and if the season proves dry, it should be now and then refreshed with water. When the plants are come up they should be kept constantly clear from weeds; and when they have remained two years upon this bed, they should be transplanted about the beginning of October into beds of fresh undunged soil, about four or five feet wide, and planted in rows about one foot asunder, and six inches distance from each other in the rows; the surface of the ground about their roots should be covered with some mulch; they should be watered in dry weather, and kept clear from weeds in summer, trimming them according to the purpose for which they are designed. In these beds let them remain two or three years, according to their growth; then they should be removed in autumn into a nursery, and planted in rows at three feet distance, and eighteen inches asunder in the rows. In the summer season they should still continue to be trimmed, according to the design for which they are intended; and after they have continued here two or three years, they may be transplanted to the places in which they are designed to remain. In gardens, this tree, being an evergreen, is used to form hedges for the defence of exotic plants, than which there is no tree more proper, and may be rendered better than any other fence whatever. This tree is so tonsile that it may be easily reduced to any shape, and was hence, in former times, cut into the most grotesque and ludicrous figures by way of what was supposed to be ornament. The trunk often grows to a very large size. Mr. Pennant takes notice of a very remarkable decayed one in Fortingal church-yard, which measured fifty-six and a half feet in circumference.

TAY, a river of Scotland, which rises in the west side of the county of Perth, and runs into the German sea below Perth, forming a large bay at its mouth, called the Frith of Tay.

TAYLOR (Dr. Jeremy), a pious, eloquent, and learned prelate, was the son of a barber at Cambridge. He received his academical education at Caius-college, in that university, and on entering into orders he for some time supplied the divinity lecturer's place in St. Paul's cathedral, which brought him acquainted with archbishop Laud, who was so pleased with his parts, as to get him elected fellow of All-souls college, Oxford. He also became a chaplain to the archbishop, who bestowed on him the rectory of Uppingham, in Rutlandshire. In 1642 he was created D. D. Upon the decline of the royal cause, he retired into Wales, and kept a school. While in that situation, he wrote many books; among others A Discourse on the Liberty of Prophesying, shewing the unreasonableness of prescribing to other men's faith, and the iniquity of persecuting different opinions. He afterwards accompanied lord Conway to Ireland, where he wrote his Ductor dubitantium. Upon the restoration he returned to England, and in 1662 was appointed bishop of Down and Connor. He was nominated a privy counsellor, and the university of Dublin recommended him for their vice-chancellor. He died at Lisnegarvy, in 1667. His works are very numerous, and have lately been republished in a complete edition. The most esteemed are his Holy Living and Holy Dying, of the latter of which the three or four pages at the commencement furnish a richer display of fancy and eloquence than an equal portion at the beginning of any work, either in prose or poetry, with which we are acquainted.

Dr. Rush, the preacher of his funeral sermon, says, "Bishop Taylor had the eloquence of an orator, the acuteness of a schoolman, the profundity of a philosopher, the fancy of a poet, the piety of a saint: and so much learning, that were it parcelled out into equal portions among the clergy of his diocese, it would make them all respectable for their knowledge."

The Edinburgh Reviewers, whose delight in his taste and fancy overcame their aversion to his religious sentiments, say, "We will venture to assert there is in any one of the prose folios of Jeremy Taylor more fine fancy and original imagery—more brilliant conceptions and glowing expressions—more new figures, and new applications of old figures—more, in short, of the body and the soul of poetry, than in all the odes and the epics which have since been produced in Europe." Edin. Rev. No. 36.

We doubt not that many of our readers will peruse with much interest the following extract from the Thoresby MSS. being a letter from the bishop to one of his friends.

DEARE SIR,

I know you will either excuse, or acquit, or at least pardon mee, that I have so long seemingly neglected to make a returne to your so kind and friendly letter, when I shall tell you that I have passed thorough a great cloud, which hath wetted mee deeper than the skin. It pleased God to send the small poxe and feavers among my children; and I have, since I received y^r last, buiried two sweet, hopeful boys, and have now but one sonne left, whom I intend (if it pleases God) to bring up to London before Easter, and then I hope to waite upon you, and by your sweet conversation, and other divertisements, if not to alleviate my sorrowes, yet at least to entertaine myselfe, and keepe mee from too intense and actual thinkings of my trouble.—Dear S^r will you doe so much for mee as to beg my pardon of Mr. Phurland that I have yet made no returne to him for his so friendly letter and expressions. S^r you see there is too much matter to make excuse; my sorrow will at least render me an object of every good man's pity and commiseration: but for myselfe I bless God I have observed and felt so much mercy in this angry dispensation of God's, that I am almost transported, I am sure highly pleased, with thinking how infinitely sweet his mercies are, when his judgments are so gracious. —S^r there are many particulars in your letter to which I would faine have answered; but still my little sadness intervenes and will yet suffer me to write nothing else: but that I beg your prayers, and that you will still owne me to be,

Dear and Honoured S^r,
Your very affectionate freind,
and hearty servant,
Feb. 22, 165$\frac{7}{6}$. JER. TAYLOR.

TAYLOR (John), commonly called the water-poet, was born in Gloucestershire, about 1580. He describes the compass of his learning in the following lines:

"I must confess I do want eloquence,
And never scarce did learn my accidence;
For having got from possum to posset,
I there was gravell'd, could no further get."

He was denominated the water-poet from having been put apprentice to a waterman. He found time, however, to write eighty books, several of which created great diversion at the time, and were thought worthy of being collected into a folio volume. In 1642 he went to Oxford, where he kept a victualling house, and assisted the king's service by his facetious songs and ballads. When Oxford surrendered, he went to London, and kept a public house in Phœnix alley, Long Acre, which he called the mourning crown. The sign displeased the government, and instead of it he hung up his own effigy with these lines under:

There's many a head stands for a sign,
Then, gentle reader, why not mine?

He died in 1654, aged 74.

Taylor (John), a learned dissenting minister, was born near Lancaster. He was pastor of a congregation at Norwich, many years, and removed from thence to Warrington, where he superintended the academy. He died in 1761. His greatest work was an Hebrew and English Concordance, in 2 vols. folio; besides which he published several pieces in divinity.

Taylor (John), an able critic, was the son of a barber at Shrewsbury, and born there in 1703. He received his education at the grammar school of Shrewsbury, and then went to St. John's college, Cambridge, where he became fellow. In 1732 he was appointed librarian, and afterwards registrer of the university. The same year appeared his Lysias, which is now very scarce. He also published a capital edition of Demosthenes, and a work of his own, entitled Elements of Civil Law, which was attacked by Warburton. He was for some time a member of Doctor's Commons, but afterwards thought proper to enter into orders, and obtained a residentiaryship of St. Paul's, and the archdeaconry of Buckingham. He died in 1766.

Taylor (Dr. Brook), was born at Edmonton, August 18th, 1685. He was the son of John Taylor, esq. of Bifron's-house in Kent, by Olivia, daughter of sir Nicholas Tempest, of Durham, baronet. His grandfather, Nathaniel Taylor, was one of those puritans whom "Cromwell thought fit to elect by a letter, dated June 14, 1653, to represent the county of Bedford in parliament." The character of his father partook in no small degree of the austerity that had been transmitted to him in the line of his ancestors, and by the spirit of the times in which they lived; and to this cause may be ascribed the disaffection which sometimes subsisted between the father and even such a son as is the subject of this article. In music he possessed uncommon accomplishment, and equally excelled in drawing and painting, of which some specimens are still preserved, that require not those allowances for error or imperfection with which we scan the performances of even the superior dilettanti:—they will bear the test of scrutiny and criticism from artists themselves, and those of the first genius and professional abilities. His classical education was conducted at home under a private tutor; and his proficiency in the ordinary branches of the languages and the mathematics was so great, that he was deemed qualified for the university at the early age of fifteen.

He was entered a fellow commoner of St. John's college, Cambridge, in 1701; a period when mathematics engaged more particularly the attention of the university. In 1708 he wrote his treatise On the Centre of Oscillation, which was not published in the Philosophical Transactions till some years afterwards. In 1709 he took his degree of bachelor of laws. In 1712 he was chosen a fellow of the Royal Society. During the interval between these two periods, he corresponded with professor Keil on several of the most abstruse subjects of mathematical disquisition. Sir William Young informs us, that he has in his possession a letter, dated in 1712, addressed to Mr. Machin, which contains at length a solution of Kepler's problem, and marking the use to be derived from that solution. In this year he presented to the Royal Society three different papers: one, On the Ascent of Water between two Glass Planes; a second, On the Centre of Oscillation; and a third, On the Motion of a stretched String. It appears from his correspondence with Keil that in 1713 he presented a paper on his favourite subject of music; but this is not preserved in the Transactions.

His distinguished proficiency in those branches of science which engaged the particular attention of the Royal Society at this period, and which embroiled them in contests with foreign academies, recommended him to the notice of its most illustrious members; and in 1714 he was elected to the office of secretary. In this year he took at Cambridge his degree of doctor of laws; and at this time he transmitted, in a letter to sir Hans Sloane, an Account of some curious Experiments relative to Magnetism; which, however, was not delivered to the society till many years afterward, when it was printed in the Transactions. His application to those studies to which his genius inclined was indefatigable: for we find that in 1715 he published in Latin his Methodus Incrementorum; also a curious essay preserved in the Philosophical Transactions, entitled, An Account of an Experiment for the Discovery of the Laws of Magnetic Attraction; likewise a treatise well known to the mathematicians, and highly valued by the best judges, On the Principles of Linear Perspective. In the same year he conducted a controversial correspondence with the count Raymond de Montmort, on the Tenets of Malebranche; which occasioned his being particularly noticed in the eulogium pronounced by the French Academy on the decease of that eminent metaphysician.

The new philosophy of Newton (as it was then called) engaged the attention of mathematicians and philosophers both at home and abroad. At Paris it was in high estimation; and in consequence of many urgent invitations, he determined to visit his friends at Paris in the year 1716. Besides the mathematicians, to whom he had always free access, he was here introduced to lord Bolingbroke, the count de Caylus, and bishop Bossuet. Among the ladies who honoured him with a particular regard, we may mention the names of Marcilly de Villette, and of Miss Brunton, the beautiful and accomplished niece of sir Isaac Newton.

Early in 1717 he returned to London, and composed three treatises, which were presented to the Royal Society, and published in the 30th volume of the Transactions. About this time his intense application had impaired his health to a considerable degree; and he was under the necessity of repairing, for relaxation and relief, to Aix-la-Chapelle. Having likewise a desire of directing his attention to subjects of moral and religious speculation, he resigned his office of secretary to the Royal Society in 1718. After this he applied to subjects of a very different kind. Among his papers were found detached parts of a Treatise on the Jewish Sacrifices, and a dissertation of considerable length on the Lawfulness of eating Blood. He did not, however, wholly neglect his former subjects of study, but employed his leisure hours in combining science and art; with this view he revised and improved his treatise on Linear Perspective. Drawing continued to be his favourite amusement to his latest hour; and it is not improbable, that his valuable life was shortened by the sedentary habits which this amusement, succeeding his severer studies, occasioned.

Toward the end of the year 1720, Dr. Brook Taylor accepted the invitation of lord Bolingbroke to spend some time at La Source, a country seat near Orleans. In the next year he returned to England, and published the last paper which appears with his name in the Philosophical Transactions, entitled, An Experiment made to ascertain the Proportion of Expansion of Liquor in the Thermometer, with regard to the Degree of Heat.

In 1721 the doctor married Miss Bridges, of Wallington, in the county of Surrey, a young lady of good family, but of small fortune; and this marriage occasioned a rupture with his father, whose consent he had never obtained. The old gentleman, however, found his heart relent when he heard of the pregnancy of his son's wife; and gave them to understand that he should be thoroughly reconciled to them, if the child when it was born should be a son. This produced so much solicitude in the breast of his amiable daughter-in-law, that when, on enquiring of the midwife the sex of the child, she was told it was a boy, she expired in the extacy with which she received the information! This happened in 1725, and his infant son died soon after. In 1727, he formed a new connection; and with the full approbation of his father and family, married Sabetta, daughter of John Sawbridge, esq. of Olantigh in Kent. In 1729, on the death of his father, he succeeded to the family estate of Bifrons. In the following year he lost his wife in child-bed. The daughter whose birth occasioned this melancholy event survived, and became the mother of sir William Young, to whom we owe these memoirs of his grandfather.

Between 1721 and 1730, no production by Brook Taylor appears in the Philosophical Transactions; nor did he publish in the course of that time any work. His biographer has found no traces of his learned labour, excepting a Treatise of Logarithms, which was committed to his friend lord Paisley (afterward Abercorn), in order to be prepared for the press; but which probably was never printed. His health was now much impaired; and his remaining days were days of increasing imbecility and sorrow. The essay entitled Contemplatio Philosophica, published by sir William Young, 1793, appears to have been written about this time, and probably with a view to abstract his mind from painful recollections and regret. It was the effort of a strong mind, and is a most remarkable example of the close logic of the mathematician applied to metaphysics. Having survived his second wife little more than a year, Dr. Brook Taylor died of a decline in the 46th year of his age, December the 29th, 1731, and was buried in the church-yard of St. Ann's, Soho. "I am spared," says his biographer, "the necessity of closing this biographical sketch with a prolix detail of his character: in the best acceptation of duties relative to each situation of life in which he was engaged, his own writings and the writings of those who best knew him, prove him to have been the finished Christian, gentleman, and scholar."

TAYLOR BIRD. See MOTACILLA.

TAYLOR'S THEOREM, in the higher mathematics, is a most elegant and fertile formula, given by Dr. Brook Taylor, in cor. 2, prop. 7, page 23, of his Method of Increments. It is in purport as follows:—If x and z be any two variable quantities, the relation of which is given, then while x by flowing uniformly is increased by $\dot{x}$, z will be increased by $\dot{z} + \frac{\ddot{z}}{1\cdot2} + \frac{\dddot{z}}{1\cdot2\cdot3} +$ &c. in which the values of $\dot{z}$, $\ddot{z}$, &c. are to be determined from the given equation.

For the convenience of demonstration the theorem may be thus expressed:

If z and x be cotemporaneous values of two quantities any how related, and $\underset{\cdot}{z}$ and $\dot{x} =$ flux. of x, cotemporaneous increments, of which x is uniformly generated; then will

$$z+\underset{\cdot}{z}=z+\frac{\dot{z}}{1}+\frac{\ddot{z}}{1\cdot2}+\frac{\dddot{z}}{1\cdot2\cdot3}+\dots\frac{\overset{m\cdot}{z}}{1\cdot2\dots m}+\&c.$$

when this series terminates or converges.

Demonstration.

Let $\left.\begin{array}{l} x,\ x+\underset{\cdot}{x},\ x+2\underset{\cdot}{x}\ \dots\dots\ x+\dot{x} \\ z,\ z',\ z'',\ z'''\ \dots\dots\ z+\underset{\cdot}{z} \end{array}\right\}$ be cotemporaneous values of x and z.

Let also $\left.\begin{array}{l} a,\ a',\ a'',\ a''',\ \&c. \\ b,\ b',\ b'',\ \&c. \\ c,\ c'',\ \&c. \\ d,\ \&c. \end{array}\right\}$ be differences of the respective orders.

Then, by the theorem for differences,

$$z+\underset{\cdot}{z}=z+na+\frac{n.(n-1)}{1\cdot2}b+\frac{n(n-1)(n-2)}{1\cdot2\cdot3}c+\&c.$$

where n is the number of successive values from x to $x+\dot{x}$, or from z to $z+\underset{\cdot}{z}$. Now, if n be increased *sine limite*, any assigned number of terms of this quantity approaches to the same number of terms in the series,

$z + na + \frac{n^2b}{1\cdot2} + \frac{n^3c}{1\cdot2\cdot3} +$ &c. as its limit; or, because $n = \frac{\dot{x}}{\underset{\cdot}{x}}$, to its equal $z + \frac{a}{\underset{\cdot}{x}}\dot{x} + \frac{b}{\underset{\cdot}{x}^2}\cdot\frac{\dot{x}^2}{1\cdot2} +$ &c. But when n is so increased the limiting ratio of a to $\underset{\cdot}{x}$, or the limiting ratio of the increments of z and x is the ratio of the fluxions of z and x, and it follows therefore that when n is increased *sine limite*, the limiting value of $\frac{a}{\underset{\cdot}{x}} = \frac{\dot{z}}{\dot{x}}$. Also, for the same reason $\frac{b}{\underset{\cdot}{x}} = \frac{\dot{a}}{\underset{\cdot}{x}}$, $\frac{c}{\dot{x}} = \frac{\dot{b}}{\underset{\cdot}{x}}$, &c. Whence the

$$\text{lim. val. of } \frac{b}{\underset{\cdot}{x}^2} = \frac{\dot{a}}{\dot{x}\underset{\cdot}{x}} = \frac{\ddot{z}}{\dot{x}^2}, \text{ because } \frac{\dot{a}}{\underset{\cdot}{x}} = \frac{\ddot{z}}{\dot{x}}$$

$$\text{of } \frac{c}{\underset{\cdot}{x}^3} = \frac{\dot{b}}{\dot{x}\underset{\cdot}{x}^2} = \frac{\dddot{z}}{\dot{x}^3}, \text{ because } \frac{\dot{b}}{\underset{\cdot}{x}^2} = \frac{\dddot{z}}{\dot{x}^2}$$

&c. &c.

Whence the limiting value of $z + na + \frac{n(n-1)}{1\cdot2}b + \frac{n(n-1)(n-2)}{1\cdot2\cdot3}c +$ &c. when n is increased *sine limite* is $z + \frac{\dot{z}}{1} + \frac{\ddot{z}}{1\cdot2} +$ &c. And because when the former series terminates its value is $z + \underset{\cdot}{z}$; and when it converges its limit is also $z + \underset{\cdot}{z}$: therefore $z + \underset{\cdot}{z} = z + \frac{\dot{z}}{1} + \frac{\ddot{z}}{1\cdot2} +$ &c. when the series terminates or converges. When it does not converge nothing can be asserted of it, because we cannot reason concerning a limit which does not exist.

The above demonstration is by Dr. Brinkley. Other demonstrations may be seen at p. 25. Calcul Differentiel, &c. par Lacroix, and a synthetical one in the works of Frisi.

Taylor's theorem may be more generally expressed: for if z be a quantity composed of two or more independent quantities x, y, v, &c. then while x, y, v, &c. by flowing uniformly, become $x + \dot{x}$, $y + \dot{y}$, $v + \dot{v}$, &c. z will become $\dot{z} + \frac{\ddot{z}}{1\cdot2} +$ &c.

For the use of this theorem in finding fluxions *per saltum*, in approximating to the roots of equations, &c. see an ingenious paper by Dr. Brinkley in the seventh volume of the Transaction of the Irish Academy. And for an explanation of the cases in which the theorem is defective, and for the determination of its limits, see Francœur, Mathematiques Pures, tom. ii. p. 243—254.

TEA, and TEA-TREE. See THEA.

As the tea-tree grows principally between the 30th and 40th degrees of latitude, it might be easily raised in Europe: indeed, from the success with which plantations of this shrub have lately been established by a society of nuns in Franconia, near Würzburg, there is great reason to believe that it would also prosper in the southern counties of Britain, if proper attention were paid, till it became habituated to our climate. There are, besides, many indigenous vegetables that may be advantageously substituted; such are sage, balm, peppermint, and similar spicy plants; the flowers of the sweet woodroof; those of the burnet, or pimpernel rose; the leaves of peach and almond-trees; the young and tender leaves of bilberry, and common raspberry; and, lastly, the blossoms of the black-thorn, or sloe-tree, most of which, when carefully gathered, and dried in the shade (especially if they be managed like Indian tea-leaves), can with difficulty be distinguished from the foreign teas, and are at the same time of superior flavour and salubrity.

Teas are divided, in Britain, into three kinds of green, and five of Bohea. The former class includes, 1. Imperial, or bloom tea, having a large leaf, a faint smell, and being of a light-green colour: 2. Hyson, which has small curled leaves, of a green shade, inclining to blue: and 3. Singlo tea, thus termed from the place where it is cultivated.—The Boheas comprehend: 1. Souchong, which, on infusion, imparts a yellowish-green colour. 2. Camho, a fine tea, emitting a fragrant violet smell, and yielding a pale shade: it receives its name from the province where it is reared. 3. Pekoe tea, is known by the small white flowers that are mixed with it. 4. Congo, has a larger leaf than the preceding variety, and yields a deeper tint to water: and 5. Common Bohea, the leaves of which are of an uniform green colour. There are, besides, other kinds of tea, sold under the names of gunpowder-tea, &c. which differ from the preceding only in the minuteness of their leaves, and being dried with additional care.

Much has been said and written on the medicinal properties of tea: in its natural state, it is doubtless a narcotic, or stupefying plant; on which account, even the Chinese refrain from its use, till it has been divested of this property by the processes above described. If, however, good tea be drunk in moderate quantities, with sufficient milk and sugar, it invigorates the system, and produces a temporary exhilaration; but, when taken too copiously, it is apt to occasion weakness, tremor, palsies, and various other symptoms, similar to those arising from narcotic plants; while it doubtless contributes to aggravate the hysteric and hypochondriacal complaints, which now very generally prevail in both sexes. This drug has, farther, been supposed to possess considerable diuretic and sudorific virtues; which, however, depend more on the quantity of warm water employed as a vehicle than the quality of the tea itself. Lastly, as infusions of these leaves are the safest refreshment after undergoing great bodily fatigue, or mental exertion, they afford an agreeable beverage to those who are exposed to cold weather; at the same time tending to support and promote that perspiration which is otherwise liable to be impeded.

TEA (Buckthorn), in botany. See RHAMNUS.

Tea (New Jersey), in botany. See Ceanothus.

Tea (New Zealand), in botany. See Philadelphus.

Tea (Oswego), in botany. See Monarda.

Tea (West Indian), in botany. See Sida.

To TEACH. *v. a.* pret. and part. pass. *taught*, sometimes *teached*, which is now obsolete. (ʒæcan, Saxon.) 1. To instruct; to inform (*Milton*). 2. To deliver any doctrine or art, or words to be learned (*Milton*). 3. To show; to exhibit so as to impress upon the mind (*South*). 4. To tell; to give intelligence (*Tusser*).

To Teach. *v. n.* To perform the office of an instructor (*Shakspeare*).

TE'ACHABLE. *a.* (from *teach.*) Docile; susceptive of instruction (*Watts*).

TE'ACHABLENESS. *s.* Docility; willingness to learn; capacity to learn.

TE'ACHER. *s.* (from *teach.*) 1. One who teaches; an instructor; a preceptor (*Hooker. Blackmore*). 2. A preacher; one who is to deliver doctrine to the people (*South*).

TEAD, or Tede. *s.* (*tæda*, Latin.) A torch; a flambeau: not in use (*Spenser*).

TEAGUE. *s.* A name of contempt, used for an Irishman.

TEAK TREE, the oak of the Eastern world; a most valuable timber-tree, indigenous to Pegu, Hindustan, Malaga, and most of the oriental countries; and, like the oak in Europe, employed very generally for ship-building and all inland purposes when a strong and durable wood is required. From the excellent properties of this timber and the peculiar soil and climate which it demands, the patriotic Society of Arts, Commerce, and Manufactures have lately expressed their opinion that it may be successfully cultivated in our West Indian and African settlements, and have consequently recommended a trial to this effect.

The best account of the teak tree that we have yet met with is the following of Dr. Roxburgh of Calcutta, whose botanical activity is well known to every one. We extract it from the Transactions of the Society of Arts, &c.

"The timber of the teak tree is in India what oak is in England: it is, however, unnecessary to enlarge on their comparative value, because oak will not grow in India. Our attention ought therefore to be confined to teak alone, not only as being by far the best wood we yet know of in this country for ship-building, but also for the house-carpenter, and almost every other work where strong, durable, easily-wrought, light wood is required. The advantages to be derived from the cultivation of so valuable a tree, where nature has not bestowed it, must, therefore, be obvious to every one; particularly in Bengal, where it grows well, and the demand is so great. The teak tree is a native of Pegu.

"Government, sensible of what is here stated, have long given every possible encouragement for an extensive propagation. But to render it still more general, the native landholders must be made sensible of the advantages they may expect to derive from large plantations thereof.

"The growth of the tree is rapid, and at all ages the wood (from various experiments) appears excellent. Some trees in the Honourable Company's Botanic Garden, brought from the Rajahmundry Circar in 1787, were, in 1804, from three to upwards of four feet in girth, at three and a half feet above ground, and high in proportion. These plants were about twelve months old when sent from the coast, so that their present age is about seventeen years. A tree promising so much advantage in so short a space, compared to what the oak requires in England to become serviceable in the marine yard, makes it highly worthy of every attention and encouragement. A few observations on rearing the plants from the seed seem necessary, as I have often known seeds from the same tree succeed with one person, and totally fail with another.

"The nut in which the seeds are lodged is exceeding hard, contains four cells, and in each is lodged a single small seed. It has been ascertained, that they perfectly retain their vegetating power in the growth, even as far as eighteen months; however, it is advisable to sow them about the beginning of the first periodical rains, or north-westers, after they are taken ripe from the tree in October. If sown about this period, or rather before than after, in well-shaded beds, about an inch asunder, and covered with about a quarter of an inch of earth, with a little rotten straw or grass spread over the earth, to keep the beds in an uniform state of humidity, by gentle waterings, should the weather prove dry; most of the nuts will be found to produce from one to four plants, in from four to eight weeks. However, it sometimes happens, that many will remain in the ground until the commencement of the second rains, nay even of the third; however, this is rare, yet it will be advisable to sow the seed on a spot that can be spared, at least until the rains of the second season are well advanced; by not attending to this circumstance, many have thought the seed bad, consequently caused the ground to be dug up for other purposes.

"The plants, when they first make their appearance, are very small, scarce so large as a cabbage plant when it first springs from the earth; their growth is, however, rapid. When they are about one or two inches high, they ought to be transplanted into other beds, at the distance of about six inches from each other, there to remain until the beginning of the next year's rains, when they are to be planted out to where they are to remain, or they may, when from two to four inches high, be planted out at once to where they are to grow; and it is not perfectly clear but by so doing they succeed better; as in taking up plants of any considerable size, say from one to two or more feet high, the roots are very apt to be injured, particularly the sap root, which retards their growth much, nay often kills them.

"About Calcutta they thrive luxuriantly in most places where they have been tried, and any tolerable degree of care taken of them; so that the only observations which seem necessary to be made on this head, are to avoid sowing the seed, or planting in such places as are low, or subject to be inundated; to keep them clear from weeds, and sparingly watered during dry weather, for the first year only. In a good soil, not much overrun with that coarse, white-flowered grass, called by the natives woola (saccharum), they will scarce require any care whatever after the first six months, from the time of being planted out where they are to stand. They will then be about eighteen months old, supposing them to have been transplanted twice, and in that time they will, in general, be from five to ten feet high, according as the soil is favourable, and out of all danger, except from north-westers.

"With respect to the distance at which plants ought to stand in plantations, every one's judgment can direct. The oak requires a great space, as the crooked parts thereof are the most valuable, and required for the knees and other curved timber in ship-building; but teak is naturally a straight-grained tree, and only used in Bengal, or at least in general, for the straight work, sissoo being commonly employed for knees and other crooked timber; hence it may be concluded, that the straighter the teak trees grow, the more eligible for every purpose for which this timber is generally employed in Bengal. They do not, therefore, require to be planted at a great distance, suppose from six to ten feet, in quincunx order; by being so close they grow straighter, and protect one another while young, which is particularly wanted where violent gusts of wind, such as our north-westers, prevail. When the trees grow up, they can be thinned out to advantage, as the timber of the young trees will answer for a variety of uses. The seed of this tree we have now in such abundance as to render a few hundred plants, in the hundred biggahs, of little or no importance; and if the ground on which they are planted is not of the best sort, the more necessity there is for planting close.

"Suppose the trees planted in quincunx order, eight feet asunder, a Bengal biggah (which I believe is generally reckoned a square of one hundred and twenty feet) will hold about three hundred and ten trees.

"It will be necessary, during the first ten years, to cut down about half of them, say one hundred and seventy, to give the rest more room; they are worth one rupee each.

"Again, at from ten to twenty years, reckon half (eighty-five) of the remaining one hundred and seventy to be cut down, to make still more room for the rest, they will be worth four rupees each.

"And again, at from twenty to twenty-five years, it may be necessary to thin them still more, say to another half, (or one-eighth of the original number) which will be worth eight rupees each. The remaining forty-two trees, when full grown, may in thirty years be expected to have, on an average, shafts or trunks thirty feet long, and at least four feet in circumference, which gives, according to the bases of timber merchants' measurement, a girth or square of twelve inches. The dimensions of such a piece of timber will therefore be thirty square feet, or three-quarters of a ton, which, at one rupee (or about two shillings and sixpence sterling) per square foot, the average price of Pegu teak in this place (Calcutta) for some time past, will amount to thirty rupees per tree. Nor is it likely that the price of this indispensable commodity will fall; our growing trade, and consequent increase of shipping, gives reason to think it will rather rise in price. Let us, however, be on the safe side, and say that each of the last-mentioned forty-two trees will be worth only twenty rupees each.

"From the above statement, the value of a biggah of land, planted with teak trees, will produce, during thirty years, as follows:

	Rupees.
In the first ten years 170 are cut, and reckoned to be worth one rupee each, is - - - - - -	170
In the next ten years 85 more are cut, and worth four rupees each, is - -	340
In the next following five years 43 more are cut, and worth eight rupees each, is - - - - - -	344
At the end of thirty years, the remaining 42 trees are reckoned worth 20 rupees each, is - - - - -	840
Total produce at the end of thirty years	1694

"Independent of the branches, many of the largest of which will be fit for knees, and other crooked timbers, of small dimensions, consequently of considerable value.

"From the above sum of 1694 rupees is to be deducted the rent of land for the before-stated time, together with the expence of planting, hedging, and taking care of the young plants during the first few years; after that they will require little or no care.

	Rupees.
The former let us suppose to be three rupees the biggah, which is certainly an high rent, and will amount, in thirty years, to - - - -	90
Charges of planting and hedging, say	20
Wages of one man, per biggah, which is fully sufficient, for the first five years, at 36 rupees yearly - -	180
For the next twenty-five years, allow one man to three biggahs, is for one biggah twelve rupees, or for twenty-five years - - - - - -	300
Total charges of one biggah for thirty-five years - - - - - -	590
Deducted from rupees 1694, leaves a clear profit of - - - -	1104

"Potatoes, leguminous, and culinary plants, meliorating crops, may, with advantage to the plantation, be reared in constant succession, on the same ground, during the first two or three years, or until the tops of the trees are too large to admit of their growth. The produce thereof will help to defray the expence of labouring the ground during that period; afterwards, as already observed, little more will be required than keeping up a fence round the plantation, to keep cattle and idle people from hurting the trees, till they are so large as to be out of all danger."

TEAL, in ornithology. See ANAS.

TEAM. *s.* (ʒýme, Saxon, a yoke.) 1. A number of horses or oxen drawing at once the same carriage (*Roscommon*). 2. Any number passing in a line (*Dryden*).

TEAR. (*lachryma.*) The limpid fluid secreted by the lachrymal glands, and flowing on the surface of the eye.

The organ which secretes this liquid is formed by the lachrymal glands, one of which is situated in the external canthus of each orbit, and emits six or seven excretory ducts, which open on the internal surface of the upper eyelid above its tarsus, and pour forth the tears. The tears have mixed with them an arterious roscid vapour, which exhales from the internal surface of the eyelids, and external of the tunica conjunctiva, into the eye. Perhaps the aqueous humour also transudes through the pores of the cornea on the surface of the eye. A certain part of this aqueous fluid is dissipated in the air; but the greatest part, after having performed its office, is propelled by the orbicular muscle, which so closely constringes the eyelid to the ball of the eye, as to leave no space between, unless in the internal angle, where the tears are collected. From this collection the tears are absorbed by the orifices of the punctæ lachrymaliæ; whence they are propelled through the lachrymal canals, into the lachrymal sac, and flow through the ductus nasalis into the cavity of the nostrils, under the inferior concha nasalis. The lachrymal sac appears to have been formed of longitudinal and transverse muscular fibres; and its three orifices furnished with small sphincters, as the spasmodic constriction of the punctæ lachrymaliæ proves, if examined with a probe.

The tears have no smell, but a saltish taste, as people who weep perceive. They are of a transparent colour and aqueous consistence.

The quantity, in its natural state, is just sufficient to moisten the surface of the eye and eyelids; but from sorrow, or any kind of stimulus applied to the surface of the eye, so great is the quantity of tears secreted, that the punctæ lachrymaliæ are unable to absorb them. Thus the greatest part runs down from the internal angle of the eyelids, in the form of great and copious drops upon the cheeks. A great quantity also descends, through the lachrymal passages, into the nostrils; hence those who cry have an increased discharge from the nose.

Properties.—Tears exposed to the atmosphere, or evaporated by a gentle heat, dry into a luteal mass, which often exhibits cubic crystals. Lime water is not rendered turbid by tears, because the soda they contain is not aerated, but caustic; and thus the syrup of violets is rendered green. Fresh tears are perfectly dissolved in water, but dried tears are not. They are coagulated by alkohol of wine, and a culinary salt and soda is obtained by evaporation. Fresh as well as dried tears are soluble in alkaline salts. Fresh tears are not changed by the acid of vitriol, or acid of salt; but those dried are dissolved with an effervescence. They are momentaneously inspissated by the oxygenated muriatic acid, as well as by the oxygene attracted from the atmosphere.

The constituent principles are,

1. Water, which constitutes the greatest part of tears.

2. A peculiar mucus, coagulated by alkohol of wine.

3. Culinary salt, caustic, and phosphorated soda; phosphorated calx is also obtained from the incinerated carbone.

Use of the tears.—1. They continually moisten the surface of the eye and eyelids, to prevent the pellucid cornea from drying and becoming opake, or the eye from concreting with the eyelids. 2. They prevent that pain, which would otherwise arise from the friction of the eyelids against the bulb of the eye from continually winking. 3. They wash and clean away the dust of the atmosphere, or any thing acrid that has fallen into the eye, by the true vis medicatix. 4. Weeping unloads the head of congestions.

To TEAR. *v. a.* pret. *tore*, anciently *tare*; part. pass. *torn*. (ꞇæꞃan, Saxon: pronounced *tare*.) 1. To pull in pieces; to lacerate; to rend; to separate by violent pulling (*Arbuth.*). 2. To laniate; to wound with any sharp point drawn along (*Shakspeare*). 3. To break by violence (*Dryden*). 4. To divide violently; to shatter (*Locke*). 5. To pull with violence; to drive violently (*Dryden*). 6. To take away by sudden violence (*Addison*).

To TEAR. *v. n.* (*tieren*, Dutch.) To fume; to rave; to rant turbulently (*L'Estrange*).

TEAR. *s.* (from the verb.) A rent; a fissure.

TEA'RER. *s.* (from *to tear.*) He who rends or tears; one who blusters.

TE'ARFALLING. *a.* (*tear* and *fall.*) Tender; shedding tears (*Shakspeare*).

TE'ARFUL. *a.* (*tear* and *full.*) Weeping; full of tears (*Pope*).

To TEASE. *v. a.* (ꞇæꞅan, Saxon.) 1. To comb or unravel wool or flax. 2. To scratch cloth in order to level the nap. 3. To torment with importunity; to vex with assiduous impertinence (*Prior*).

TEASEL, in botany. See DIPSACUS.

TE'ASER. *s.* (from *tease.*) Any thing that torments by incessant importunity (*Collier*).

TEAT. (*teth*, Welsh; ꞇıꞇ, Saxon; *tette*, Dutch.) The dug of a beast; anciently the pap of a woman (*Brown*).

TEBESSA, a town of the kingdom of Tunis, with several remains of antiquity. It is seated at the foot of a mountain. Lon. 8. 5 E. Lat. 34. 51 N.

TEBZA, a strong town of the kingdom of Morocco, capital of a province of the same name. It carries on a good trade, and is seated on the side of one of the mountains of Atlas. Lon. 4. 55 W. Lat. 32. 50 N.

TECHMESSA, the daughter of a Phrygian prince, called Teuthras. When her father was killed in war by Ajax, son of Telamon, the young princess became the property of the conqueror, and by him she had a son called Eurysaces.

TE'CHNICAL. *a.* (τεχνικος.) Belonging to arts; not in common or popular use (*Locke*).

TE'CHY. *a.* Peevish; fretful; irritable; easily made angry; forward (*Shakspeare*).

TECKLENBURG, a town of Westphalia, capital of a county of the same name, with a castle on a hill. It was bought by the king of Prussia in 1707, and is 12 miles S.W. of Osnaburg, and 25 N.E. of Munster. Lon. 8. 2 E. Lat. 52. 20 N.

TECOANTEPECA, a considerable seaport of New Spain, in the audience of Mexico and province of Guaxaca, seated on a bay of the same name, in the Pacific Ocean. It has a fortified abbey, and several handsome churches. Lon. 95. 15 W. Lat. 15. 28 N.

TECORT, or TICARTE, a strong town of Barbary, capital of a kingdom of the same name, in Biledulgerid. It is seated on a mountain, 420 miles S.W. of Tripoli. Lon. 7. 55 E. Lat. 29. 35 N.

TECRIT, a town of Turkey in Asia, in the government of Mosul, 130 miles S. of Mosul.

TECTONIA. Teke-wood. In botany, a genus of the class pentandria, order monogynia. Corol five-cleft; stigma toothed; drupe dry, spongy, within the inflated calyx; nut four-celled. One species only, T. grandis, a native of the East Indies, and a very tall tree with a vast trunk: leaves opposite, ovate, slightly scalloped, mostly unequal at the base, covered with soft white down underneath, rough above; panicle terminal, cross-armed; peduncle common, quadrangular; flowers small, white, fragrant; calyx downy; drupe woolly; stamens often six.

The wood is eminently useful in India, as affording the only timber which the termes fatale or white-ant will not touch.

TECTO'NIC. *a.* (τεκτονικος.) Pertaining to building (*Bailey*).

TECULET, a seaport of the kingdom of Morocco, with an old castle, seated on the side of a mountain, at the mouth of a river of the same name. Lon. 9. 5 W. Lat. 30. 45 N.

To TED. *v. a.* (ꞇeaꝺan, Sax. to prepare.) To lay grass newly mown in rows (*Milton*).

TE'DDER, or TE'THER. *s.* (*tudder*, Dut.) 1. A rope with which a horse is tied in the field that he may not pasture too wide. 2. Any thing by which one is restrained.

TEDDINGTON, a village in Middlesex, seated on the Thames, 12 miles W.S.W. of London. The church is a perpetual curacy, which was enjoyed by the celebrated philosopher, Dr. Stephen Hales, from the year 1710, till his death in 1761. He is interred under the tower of the church, which he erected at his own expence.

TEDELEZ, a strong town of Algiers, in a province of the same name, on the coast of the Mediterranean, with a castle, 50 miles N.E. of Algiers. Lon. 3. 5 E. Lat. 47. 5 N.

TE DEUM, the name of a celebrated and very fine hymn, used in the christian church, and so called because it begins with these words, *Te Deum laudamus*, We praise thee, O God. It is sung in the Romish church with great pomp and solemnity upon the gaining of a victory, or other happy event; and is generally supposed to be the composition of St. Ambrose, bishop of Milan.

TE'DIOUS. *a.* (*tedieux*, French; *tædium*, Lat.) 1. Wearisome by continuance; troublesome; irksome (*Milton*). 2. Wearisome by prolixity (*Hooker*). 3. Slow (*Ainsworth*).

TE'DIOUSLY. *ad.* (from *tedious.*) In such a manner as to weary.

TE'DIOUSNESS. *s.* (from *tedious.*) 1. Wearisomeness by continuance (*Davies*). 2. Wearisomeness by prolixity (*Hooker*). 3. Prolixity; length (*Shakspeare*). 4. Uneasiness; tiresomeness; quality of wearying.

TEDNEST, a town of Morocco, in the province of Hea. It was taken by the Portuguese in 1517, but they were driven away soon after. It is almost surrounded by a river, 40 miles N.E. of Mogador.

To TEEM. *v. n.* (ꞇeam, Saxon, *offspring.*) 1. To bring young (*Shakspeare*). 2. To be pregnant; to engender young (*Shakspeare*). 3. To be full; to be charged as a breeding animal (*Addison*).

To TEEM. *v. a.* 1. To bring forth; to produce (*Shakspeare*). 2. To pour (*Swift*).

TE'EMER. *s.* (from *teem.*) One that brings young.

TE'EMFUL. *a.* (ꞇeamꝼul, Sax.) 1. Pregnant; prolific. 2. Brimful (*Ainsworth*).

TE'EMLESS. *a.* (from *teem.*) Unfruitful; not prolific (*Dryden*).

TEEN. *s.* (ꞇınan, Saxon; *tenen*, Flemish, to vex.) Sorrow; grief: not in use (*Shaks.*).

To TEEN. *v. a.* (from ꞇınan, to kindle, Saxon.) To excite; to provoke to do a thing (*Spenser*).

TEENS. *s.* (from *teen* for *ten.*) The years reckoned by the termination *teen*; as, thirteen, fourteen (*Glanville*).

TEES, a river which rises on the confines of Cumberland, separates the counties of Durham and York, and enters the German ocean, below Stockton.

TEESTA, or YO SANPOO, a river which rises in Tibet, and crosses Bootan into Bengal, where it divides into two streams that flow to the Ganges; one 26 miles N. the other 93 E.S.E. of Moorshedabad.

TEETH. The plural of *tooth*.

To TEETH. *v. n.* (from the noun.) To breed teeth (*Arbuthnot*).

TEETH (Origin, growth, and physiology of). See the articles ODONTOLOGY and DENTITION.

TEETH, or cogs of wheels, require great accuracy and nicety in their construction. Their forms vary much with the nature and relative magnitudes of the wheels.

For the best modes of constructing teeth, in the usual cases, see Camus, Cours de Mathematiques, tom. 2. ed. 1767, or the English translation of that part of Camus's work; Gregory's Mechanics, vol. ii.; Brewster's Ferguson's Lectures, vol. ii.; and Hachette, Traite Elementaire des Machines.

TEETHING. Dentition. The eruption of the teeth through the gums. See DENTITION.

TEFEZARA, a strong town of Algiers, in the province of Tremesen, 12 miles from the city of that name. There are a great many mines of iron in its territory.

TAFFLIS, the capital of Georgia, one of the seven Caucasian nations between the Black Sea and the Caspian. It is called by the inhabitants *Thilis-Cabar* (warm town) from the warm baths in its neighbourhood. It contains 20,000 inhabitants, of which more than half are Armenians; the remainder principally Georgians. The streets seldom exceed seven feet in breadth: and some are so narrow as scarcely to allow room for a man on horseback: they are consequently very filthy. All the houses are of stone, with flat roofs, which serve, according to the custom of the East, as walks for the women. Here is a foundery, at which are cast a few cannon, mortars, and ball; and the gunpowder made here is very good. The Armenians have established here all the manufactures carried on by their countrymen in Persia: the most flourishing is that of printed linens. Tefflis is seated on the Kur, at the foot of a mountain, 125 miles W. of Terki. Lon. 65. 3 E. Lat. 41. 59 N.

TEGAZA, a town of Zahara, capital of a territory of that name, to the N.E. of Senegal. It is remarkable for mountains of salt. Lon. 6. 30 W. Lat. 21. 40 N.

TEGEA, or TEGÆA, a town of Arcadia, in the Peloponnesus, founded by Tegeates, a son of Lycaon. The gigantic bones of Orestes were found buried there, and removed to Sparta. Apollo and Pan were worshipped there, and also Ceres, Proserpine, and Venus. The epithet Tegæa is given to Atalanta, as a native of the place.

TEGLIO, a town of the country of the Grisons, capital of a government of the same name, in the Valteline. It is situate on the top of a mountain, nine miles from Tirano, and 12 from Sondrio.

TEGULA HIBERNICA. See LAPIS HIBERNICUS.

TEGUMENTS COMMON. Under this term anatomists comprehend the cuticle, rete mucosum, skin, and adipose membrane as being the covering to every part of the body except the nails. See SKIN.

TEH-HE. *v. n.* To laugh; to titter.

TEIGN, a river in Devonshire, composed of two branches, which rise in the centre of the county, and uniting, enter the English Channel, at Teignmouth.

TEIGNES, in farriery, a disease in the foot of a horse, said in the Rustic Dictionary to exist, "when the frust moulders away in pieces, and it goes the length of the quick; for then the itching pain is so great that it will make the horse halt." See THRUSH.

TEIGNMOUTH, a seaport in Devonshire, reckoned part of Exeter. It sends a number of vessels to the Newfoundland fishery, and has a considerable coasting trade, especially in carrying tobacco-pipe clay to Liverpool, whence are brought back coal, salt, earthen ware, &c. This is the place where the Danes first landed, and where they committed several outrages. It was almost entirely destroyed by the French, who landed and set fire to it in 1690. It is seated at the mouth of the Teign, 12 miles S. of Exeter, and 280 W. by S. of London. Lon. 3. 29 W. Lat. 50. 32 N.

TEINT. *s.* (*teinte*, French.) Colour; touch of the pencil (*Dryden*).

TEISENDORF, a town of Bavaria, in the archbishopric of Saltzburg, 12 miles W.N.W. of Saltzburg.

TEISSE, a river of Hungary, which rises in the Carpathian mountains, passes by Tockay and Segedin, and falls into the Danube, near Titul.

TELA. (*tela*, a web of cloth.) The cellular membrane is so called from its likeness to a fine web.

TELAMON, a king of the island of Salamis, son of Æacus and Endeis. He was brother to Peleus, and father to Teucer and Ajax, who on that account is often called Telamonius heros. He fled from Megara his native country, after he had accidentally murdered his brother Phocus in playing with the quoit, and he sailed to the island of Salamis, where he soon after married Glauce, the daughter of Cycherus, the king of the place. At the death of his father-in-law, who had no male issue, Telamon became king of Salamis. He accompanied Jason in his expedition to Colchis, and was arm-bearer to Hercules, when that hero took Laomedon prisoner, and destroyed Troy. Telamon was rewarded by Hercules for his services with the hand of Hesione, whom the conqueror had obtained among the spoils of Troy, and with her he returned to Greece. He also married Peribœa, whom some call Eribœa.

TE'LARY. *a.* (*tela*, a web, Lat.) Spinning webs.

TELCHINES, a people of Rhodes, the

inventors of many useful arts. They were the first who raised statues to the gods. They had the power of changing themselves into whatever shape they pleased, and according to Ovid they could poison and fascinate all objects with their eyes, and cause rain and hail to fall at pleasure. They insulted Venus, for which the goddess inspired them with a sudden fury, so that they committed the grossest crimes, and offered violence even to their own mothers. Jupiter destroyed them all by a deluge.

TELEBOÆ, or TELEBOES, a people of Ætolia, called also Taphians, some of whom left their native country, and settled in the island of Capreæ.

TELEGONUS, a son of Ulysses and Circe, born in the island of Ææa, where he was educated. He went to Ithaca to make himself known to his father, but was shipwrecked on the coast, and being destitute of provisions, he plundered some of the inhabitants of the island. Ulysses and Telemachus came to defend the property of their subjects; a quarrel arose, and Telegonus killed his father without knowing who he was. He afterwards returned to his native country, and carried thither his father's body, where he was buried. Telemachus and Penelope also accompanied him in his return, and soon after the nuptials of Telegonus with Penelope were celebrated by order of Minerva. Penelope had by Telegonus a son called Italus, who gave his name to Italy. Telegonus founded Tusculum in Italy, and left one daughter called Mamilia, from whom the noble family of the Memilii at Rome were descended.

TELEGRAPH (derived from τηλε, and γραφω), is the name very properly given to an instrument, by means of which information may be almost instantaneously conveyed to a considerable distance.

The telegraph, though it has been generally known and used by the moderns only for a few years, is by no means a modern invention. There is reason to believe that amongst the Greeks there was some sort of telegraph in use. The burning of Troy was certainly known in Greece very soon after it happened, and before any person had returned from thence. Now that was altogether so tedious a piece of business, that conjecture never could have supplied the place of information. A Greek play begins with a scene, in which a watchman descends from the top of a tower in Greece, and gives the information that Troy was taken. "I have been looking out these ten years (says he) to see when that would happen, and this night it is done." Of the antiquity of a mode of conveying intelligence quickly to a great distance, this is certainly a proof.

The Chinese, when they send couriers on the great canal, or when any great man travels there, make signals by fire from one day's journey to another, to have every thing prepared; and most of the barbarous nations used formerly to give the alarm of war by fires lighted on the hills or rising grounds.

Polybius calls the different instruments used by the ancients for communicating information πυρσειαι, *pyrsiæ*, because the signals were always made by means of fires. At first they communicated information of events merely by torches; but this method was of little use, because it was necessary beforehand to fix the meaning of every particular signal. Now, as events are exceedingly various, it was impossible to express the greater number of them by any premeditated contrivance. It was easy, for instance, to express by signals that a fleet had arrived at such a place, because this had been foreseen, and signals accordingly had been agreed upon to denote it; but an unexpected revolt, a murder, and such accidents, as happen but too often, and require an immediate remedy, could not be communicated by such signals; because to foresee them was impossible.

A new method was invented by Cleoxenus (others say by Democlitus), and very much improved by Polybius, as he himself informs us. He describes this method as follows: Take the letters of the (Greek) alphabet, and divide them into five parts, each of which will consist of five letters, except the last division, which will have only four. Let these be fixed on a board in five columns. The man who is to give the signals is then to begin by holding up two torches, which he is to keep aloft till the other party has also shewn two. This is only to shew that both sides are ready. These first torches are then withdrawn. Both parties are provided with boards, on which the letters are disposed as formerly described. The person then, who gives the signal, is to hold up torches on the left to point out to the other party from what column he shall take the letters as they are pointed out to him. If it is to be from the first column, he holds up one torch; if from the second, two; and so on for the others. He is then to hold up torches on the right, to denote the particular letter of the column that is to be taken. All this must have been agreed on beforehand. The man who gives the signals must have an instrument (δοπτραν), consisting of two tubes, and so placed as that, by looking through one of them, he can see only the right side, and through the other only the left, of him who is to answer. The board must be set up near this instrument; and the station on the right and left must be surrounded with a wall (παραπεφραχθαι), ten feet broad, and about the height of a man, that the torches raised above it may give a clear and strong light, and that when taken down they may be completely concealed. Let us now suppose that this information is to be communicated—"A number of the auxiliaries, about a hundred, have gone over to the enemy." In the first, place, words must be chosen that will convey the information in the fewest letters possible; as, "A hundred Cretans have deserted," Κρετες εκατον αφ' ημων ηυτομολησαν. Having written down this sentence, it is conveyed in this manner. The first letter is a κ, which is in the second column; two torches are therefore to be raised on the left hand to inform the person who receives the signals to look into that particular column. Then five torches are to be held up on the right, to mark the letter *k*, which is the last in the column. Then four torches are to be held up on the left to point out the ϱ (*r*), which is in the fourth column, and two on the right to shew that it is the second letter of that column. The other letters are pointed out in the same manner.—Such was the pyrsia or telegraph recommended by Polybius.

But neither this nor any other method mentioned by the ancients seems ever to have been brought into general use; nor does it appear that the moderns had thought of such a machine as a telegraph till the year 1663, when the marquis of Worcester, in his Century of Inventions, affirmed that he had discovered "a method by which, at a window, as far as eye can discover black from white, a man may hold discourse with his correspondent, without noise made or notice taken; being according to occasion given, or means afforded, *ex re nata*, and no need of provision beforehand; though much better if foreseen, and course taken by mutual consent of parties." This could be done only by means of a telegraph, which, in the next sentence, is delared to have been rendered so perfect, that by means of it the correspondence could be carried on "by night as well as by day, though as dark as pitch is black."

Dr. Hooke, whose genius as a mechanical inventor was perhaps never surpassed, delivered a "Discourse to the Royal Society, May 21st, 1684, shewing a way how to communicate one's mind at great distances." In this discourse he asserts the possibility of conveying intelligence from one place to another at the distance of 30, 40, 100, 120, &c. miles, "in as short a time almost as a man can write what he would have sent." He takes to his aid the then recent invention of the telescope, and explains the method by which characters exposed at one station may be rendered plain and distinguishable at the others. He directs, "first, for the stations; if they be far distant, it will be necessary that they should be high, and lie exposed to the sky, that there be no higher hill, or part of the earth beyond them, that may hinder the distinctness of the characters that are to appear dark, the sky beyond them appearing white: by which means also the thick and vaporous air near the ground will be passed over and avoided." "Next, the height of the stations is advantageous, upon the account of the refractions or inflections of the air." "Next, in choosing of these stations, care must be taken, as near as may be, that there be no hill that interposes between them, that is almost high enough to touch the visible ray; because in such cases, the refraction of the air of that hill will be very apt to disturb the clear appearance of the object." "The next thing to be considered is, what telescopes will be necessary for such stations." "One of these telescopes must be fixed at each extreme station, and two of them in each intermediate; so that a man for each glass, sitting and looking through them, may plainly discover what is done in the next adjoining station, and with his pen write down on paper the characters there exposed in their due order; so that there ought to be two persons at each extreme station, and three at each intermediate; so that, at the same time, intelligence may be conveyed forwards and backwards. Next, there must be certain times agreed on, when the correspondents are to expect; or else there must be set at the top of the pole, in the morning, the hour appointed by either of the correspondents, for acting that day; if the hour be appointed, pendulum clocks may adjust the moment of expectation and observing." "Next, there must be a convenient apparatus of characters, whereby to communicate any thing with great ease, distinctness, and secrecy. And there must be either day characters, or night characters." The day characters "may all be made of three slit deals:" the night characters "may be made with links, or other lights, disposed in a certain order." The doctor invented 24 simple characters, each constituted of right lines, for the letters of the alphabet; and several single characters, made up of semicircles, for whole sentences. He recommended that three very long masts or poles should be placed vertically, and joined at top by one strong horizontal beam; that a large screen should be placed at one of the upper corners of this frame, behind which all the deal board characters should hang, and by the help of proper cords should quickly be drawn forwards to be exposed, and then drawn back again behind the screen. By these means, says the doctor, "all things may be made so convenient that the same character may be seen at Paris, within a minute after it hath been exposed at London, and the like in proportion for greater distances; and that the characters may be exposed so quick after one another, that a composer shall not much exceed the exposer in swiftness." Among the uses of this contrivance, the inventor specifies these: "The first is for cities or towns besieged; and the second for ships upon the sea; in both which cases it may be practised with great certainty, security, and expedition." The whole of Dr. Hooke's paper was published in Derham's collection of his Experiments and Observations; from which it appears that he had brought the telegraph to a state of far greater maturity and perfection than M. Amonton's, who attempted the same thing about the year 1702; and, indeed, to a state but little inferior to several which have been proposed during the last twenty years.

It was not, however, till the French revolution that the telegraph was applied to useful purposes. Whether M. Chappe, who is said to have invented the telegraph first used by the French about the end of 1793, knew any thing of Hooke's or of Amonton's invention or not, it is impossible to say; but his telegraph was constructed on principles nearly similar.

The manner of using this telegraph was as follows: At the first station, which was on the roof of the palace of the Louvre at Paris, M. Chappe, the inventor, received in writing from the Committee of Public Welfare, the words to be sent to Lisle, near which the French army at that time was. An upright post was erected on the Louvre, at the top of which were two transverse arms, moveable in all directions by a single piece of mechanism, and with inconceivable rapidity. He invented a number of positions for these arms, which stood as signs for the letters of the alphabet; and these, for the greater celerity and simplicity, he reduced in number as much as possible. The grammarian will easily conceive that sixteen signs may amply supply all the letters of the alphabet, since some letters may be omitted not only without detriment but with advantage. These signs, as they were arbitrary, could be changed every week; so that the sign of B for one day, might be the sign of M the next; and it was only necessary that the persons at the extremities should know the key. The intermediate operators were only instructed generally in these sixteen signals; which were so distinct, so marked, so different the one from the other, that they were easily remembered.

The construction of the machine was such, that each signal was uniformly given in precisely the same manner at all times: it did not depend on the operator's manual skill; and the position of the arm could never, for any one signal, be a degree higher or a degree lower, its movement being regulated mechanically. M. Chappe having received at the Louvre the sentence to be conveyed, gave a known signal to the second station, which was at Mont Martre, to prepare. At each station there was a watch tower, where telescopes were fixed, and the person on watch gave the signal of preparation which he had received, and this communicated successively through all the line, which brought them all into a state of readiness. The person at Mont Martre then received, letter by letter, the sentence from the Louvre, which he repeated with his own machine; and this was again repeated from the next height, with inconceivable rapidity, to the final station at Lisle.

Various experiments were in consequence tried upon telegraphs in this country; and one was soon after set up by government, in a chain of stations from the Admiralty-office to the sea-coast. It consists of six octagon boards, each of which is poised upon an axis in a frame, in such a manner that it can be either placed vertically, so as to appear with its full size to the observer at the nearest station, or it becomes invisible to him by being placed horizontally, so that the narrow edge alone is exposed, which narrow edge is from a distance invisible. Six boards make thirty-six changes, by the most plain and simple mode of working; and they will make many more if more were necessary: but as the real superiority of the telegraph over all other modes of making signals consists in its making letters, we do not think that more changes than the letters of the alphabet, and the arithmetical figures, are necessary: but, on the contrary, that those who work the telegraphs should avoid communicating by words or signs agreed upon to express sentences; for that is the sure method never to become expert at sending unexpected intelligence accurately. This telegraph is, without doubt, made up of an excellent number of combinations; five boards would be insufficient, and seven would be useless. It has been objected to it, however, that its form is too clumsy to admit of its being raised to any considerable height above the building on which it stands; and that it cannot be made to change its direction, and consequently cannot be seen but from one particular point. Several other telegraphs have been proposed to remedy these defects, and others to which the instrument is still liable. The dial-plate of a clock would make an excellent telegraph, as it might exhibit one hundred and forty-four signs, so as to be visible at a great distance. A telegraph on this principle, with only six divisions instead of twelve, would be simple and cheap, and might be raised twenty or thirty feet high above the building without any difficulty: it might be supported on one post, and therefore turn round; and the contrast of colours would always be the same.

The following are abridged descriptions of the two telegraphs invented by captain Pasley of the royal engineers, and described in the 115th and 116th numbers of the Philosophical Magazine.

1st. *A nocturnal telegraph.*—The proposed telegraph consists of six fixed lights, disposed in two rows of three lights each, one row placed exactly over the other. These are supposed to be kept constantly burning whilst the telegraph is worked; and being hid or shewn at pleasure by means of blinds, they form 41 distinct combinations or signals; the combinations of six bodies, which should properly be 63, being reduced to this number by the ambiguity arising from its being impossible to ascertain the relative places of objects by night as we can by day. The construction of the telegraph will be understood by conceiving six large lanterns attached to a strong frame of timber, placed in the upper room, or on the roof or terrace of a building; in which latter case it may be protected by a shed from the injuries of the weather. Each of these lanterns will contain a lamp, the intenseness of whose light must be proportioned to the distance between the telegraphic stations, upon which the distance of the several lanterns on the frame from each other will also depend. Every lantern must have two blinds, one on each side of it; to which are fastened strings passing through the ceiling of the signal-room, and guided by pulleys to a convenient place below, where they can be worked by a single man. The blinds are so hung, that in their natural state, when the telegraph is at rest, all the lights are hid except the middle one of the lower row, which serves to guide the eye of the observers; and is therefore called the standing light, being always exhibited during the intervals between successive signals.

In the table of combinations, or key of the telegraph, after leaving one for the standing light, and assigning 30 combinations to denote the letters of the alphabet, numerical cyphers, &c. the remaining 10 places are left blank. It is needless to explain the use of the first 30 signals, which are capable of communicating every kind of intelligence alphabetically, in a manner that is perfectly obvious. But with regard to forming a code of signals, the method proposed is this:—Let any number of words and sentences, that are most likely to occur in practice, be written in regular order, to the extent judged necessary, and if these do not exceed 300, let them be divided into sections according to a method shewn in the following table.

Number of Sections made use of.	Number of Places in each Section.	Total Number of Words and Sentences forming the Code of Signals.
1	39	 39
2	38	 76
3	37	111
4	36	144
5	35	175
6	34	204
7	33	231
8	32	256
9	31	279
10	30	300

Then let the blanks denote that "The ensuing signal will be read in the first section;"—let a second blank denote, that "The ensuing signal will be read in the second section," and so on; and thus may any list of words and sentences under 300 be represented by two changes on the telegraph, exclusive of all unusual or extraordinary intelligence, which may be communicated alphabetically by the ordinary key.

But when the number of words and sentences required exceeds 300, the signal-book must be divided into two parts, the first of which will contain a certain number of sections, composed of 30 places each, whilst the second will contain a number of sections, consisting of 900 places each; observing only that the number of sections in both parts added together must not exceed ten: then, instead of filling up the blanks in the manner before proposed, a certain number of them must denote, that "The ensuing signal must be read in such a section of part first," whilst the remaining blanks will signify, that "The two ensuing signals must be read in such a section of part second," specifying the particular sections of each; and according to the manner in which the two parts are divided, will be had a code of signals more or less extensive: as indeed is shewn by the tables, &c. given by captain Pasley; from which it appears that if the method used in the second part be carried to its utmost extent, a signal-book may be formed, containing 9000 words and sentences, that may be represented by three changes on the telegraph, retaining still the power of using the alphabetical mode when necessary. And, in fact, the number is capable of indefinite augmentation, by means of the same principle.

2d. *A polygrammatic telegraph for day signals.*—This instrument is capable of exhibiting 707,280 distinct combinations: its nature and construction being as follows:—Four upright posts are erected, each having two arms moveable on a spindle at top, which, in their natural position, hang down, but can be raised by means of strings to various degrees of extension, so as to appear in positions either vertical, horizontal, or inclined at an angle of 45 with the horizon. The length of the arms may be about six feet from the centre of motion to the ends, or more, in proportion to the distance between the telegraphic stations.—The strings should be worked by two men.

The combinations of two arms in the several positions enumerated (and shewn in a plate in the Philosophical Magazine) are 28; 18 of these are allotted to the alphabetical characters, and 10 to the numerical cyphers, so that using the common mode of signal making, every post with its arms might form a complete telegraph, were it not the object of the present proposal to go farther. A book is therefore made of words and sentences arranged in regular order, to the extent judged necessary; and let signal 2567 signify, for example, "The enemy have landed upon the south-west coast;" while signal 9304 signifies, "A convoy is just arrived from the West Indies:" then these two pieces of intelligence will be successively communicated by two simple signals.

But this telegraph has another property, namely, that of expressing words or parts of words not exceeding four letters, by a single signal: and this property enables the operator to transmit sentences comprising six or seven words, by about as many signals.

In working this telegraph, no signal is required to denote the end of a word, it being sufficient to mark a pause by leaving one of the posts in its quiescent state. And to distinguish between the numerical signals referring to the book or code, and such as are really intended to denote numbers, the unit's place of the latter must never, but that of the former must always, be placed on the fourth, or right-hand post of the telegraph. Hence this post, when left quiescent between two numbers, will not be considered to denote a pause or break, as it would between two words. Observing this restriction, it will be found that a signal-book may be formed, containing 10,999 words and sentences, if thought necessary, each to be expressed by one change on this telegraph, whilst all unforeseen intelligence can be communicated by an improved alphabetical mode; without these two methods interfering in the least with each other.

These telegraphs are both ingenious, and are especially deserving of notice, because they facilitate the transference of information, by both the methods usually adopted when telegraphs are employed, viz. by using a distinct signal for each letter, and by causing every individual signal to represent a complete sentence. In the estimation of many persons the latter method has the advantage in point of expedition; but, for our own parts, we doubt the truth of this opinion, generally speaking. Supposing there were a table, containing 10,000 of the sentences most likely to occur; let it be considered that it would be a very considerable exercise for the memory to call to mind in an instant the appropriate numerical expression for each phrase; and unless this can be done with tolerable facility, nothing is gained in point of expedition, by the circumstance of a single phrase being denoted by its appropriate signal. Besides, it is not only within the range of possibility, but very probable, that a phrase may occur to be communicated, which is not in the table, supposing it to extend to 10,000, or even more. In such emergencies, the utility of a mode of conveyance, in which the information shall be transmitted letter by letter, is obvious; and in such emergencies it is that captain Pasley's telegraphs will be found to merit a decided preference over those which convey particulars by phrases only. Still, however, it is our opinion that those who direct their attention to the improvement of telegraphs would do wisely to confine it principally to the alphabetic mode of transmission; that being manifestly the only universal mode. And we are convinced that it would be no difficult task to point out a method by which news should be transferred letter by letter, not much slower than it could be written; a degree of comparative celerity, which it cannot be at all necessary should be exceeded by telegraphic communication.

TELEMACHUS, a son of Ulysses and Penelope. He was still in the cradle when his father went with the rest of the Greeks to the Trojan war. At the end of this war, Telemachus, anxious to see his father, went to seek him, and visited the court of Menelaus and Nestor to obtain information. Returning, the suitors of his mother Penelope had conspired to murder him, but he avoided their snares, and by means of Minerva, he discovered his father, who had arrived in the island two days before him, and was then in the house of Eumæus. With this faithful servant and Ulysses, Telemachus delivered his mother from the importunities of her suitors. After the death of his father, Telemachus went to the island of Ææa, where he married Circe, or according to others, Cassiphone, the daughter of Circe, by whom he had a son called Latinus. He some time after had the misfortune to kill his mother-in-law Circe, and fled to Italy, where he founded Clusium. Telemachus was accompanied in his visit to Nestor and Menelaus by the goddess of wisdom, under the form of Mentor.

TELEMONA, a town of Tuscany, with a small harbour, and a strong fort. It is seated at the mouth of the Ossa, at the extremity of a point of a craggy rock, 10 miles from Orbitello. Lon. 11. 11 E. Lat. 42. 28 N.

TELEPHIUM, in botany, a genus of the class pentandria, order trigynia. Calyx five-leaved; petals five, inserted on the receptacle; capsule one-celled, three-valved. Two species.

1. T. oppositifolium. Leaves opposite; a native of Barbary.

2. T. imperati. True orpine. Leaves alternate, oblong-ovate; racemes terminal; flowers in corymbs, of a white colour. This species is a native of Switzerland, and cultivated in our gardens. See FABA CRASSA.

TELESIA, in mineralogy, a name given by Hauy to the sapphire, or oriental ruby of the jewellers: the perfect corundum of Bournon and Thomson; the oriental sapphire of Kirwan. See the article GEMMA. The variety in the form of a hexahedral prism appears sometimes to contain within it a similar prism, but of a different colour. The crystals are small; sometimes very small, rarely middle-sized. When the crystals, in which the summits of the primitive rhomb are replaced by secondary planes, are translucent, such planes present that varying lustre which is called *chatoyant*; and if these crystals be cut *en cabochon*, or in the form of an ellipse, taking care that the summit of the ellipse shall be situated exactly under the point corresponding with the summit of the rhomboid, there will then be produced the appearance of a star with six rays. Such stones are highly valued by the jewellers, and are called star-stones.

TELESCOPE, an optical instrument for viewing distant objects; so named by compounding the Greek words τηλε, far off, and σκοπειν, to look at or contemplate. This name is commonly appropriated to the larger sizes of the instrument, while the smaller are called perspective-glasses, spy-glasses, opera-glasses. A particular kind, which is thought to be much brighter than the rest, is called a night-glass.

TELESCOPE.

The invention of the telescope is one of the noblest and most useful these ages have to boast of: by means of it, the wonders of the heavens are discovered to us, and astronomy is brought to a degree of perfection which former ages could have no idea of.

Telescopes are either refracting or reflecting; the former consist of different lenses, through which the objects are seen by rays refracted by them to the eye; and the latter, of specula, from which the rays are reflected and passed to the eye. The lens, or glass, turned to the object, is called the object-glass; and that next the eye, the eye-glass; and when the telescope consists of more than two lenses, all but that next the object are called eye-glasses.

The principal effects of telescopes depend upon this maxim, "that objects appear larger in proportion to the angles which they subtend at the eye; and the effect is the same, whether the pencils of rays, by which objects are visible to us, come directly from the objects themselves, or from any place nearer to the eye, where they may have been united, so as to form an image of the object; because they issue again from those points in certain directions, in the same manner as they did from the corresponding points in the objects themselves. In fact, therefore, all that is effected by a telescope, is first to make such an image of a distant object, by means of a lens or mirror, and then to give the eye some assistance for viewing that image as near as possible; so that the angle, which it shall subtend at the eye, may be very large, compared with the angle which the object itself would subtend in the same situation. This is done by means of an eye-glass, which so refracts the pencils of rays, as that they may afterwards be brought to their several foci, by the natural humours of the eye. But if the eye had been so formed as to be able to see the image, with sufficient distinctness, at the same distance, without an eye-glass, it would appear to him as much magnified as it does to another person who makes use of a glass for that purpose, though he would not, in all cases, have so large a field of view.

Although no image be actually formed by the foci of the pencil without the eye, yet if, by the help of an eye-glass, the pencils of rays shall enter the pupil, just as they would have done from any place without the eye, the visual angle will be the same as if an image had been actually formed in that place.

Telescopes are of several kinds, distinguished by the number and form of their lenses, or glasses, and denominated from their particular uses, &c. —such are the terrestrial, or land telescope, the celestial, or astronomical telescope; to which may be added, the Galilean, or Dutch telescope, the reflecting telescope, the achromatic telescope, &c.

We shall proceed to describe some of these, in order to illustrate the leading principles.

I. *The Refracting Telescope.*

This telescope differs from the microscope only in that the object is placed at so great a distance from it, that the rays of the same pencil flowing from thence, may be considered as falling parallel to one another upon the object-glass; and therefore the image made by that glass is looked upon as coincident with its focus or parallel rays.

1. This will appear very plain from fig. 1, pl. 168, in which A B is the object emitting the several pencils of rays A cd, B cd, &c. but supposed to be at so great a distance from the object-glass cd, that the rays of the same pencil may be considered as parallel to each other; they are therefore supposed to be collected into their respective foci at the points m and p, situated at the focal distance of the object-glass cd. Here they form an image E, and crossing each other proceed diverging to the eye-glass hg; which being placed at its own focal distance from the points m and p, the rays of each pencil, after passing through that glass, will become parallel among themselves; but the pencils themselves will converge considerably with respect to one another, even so as to cross at e, very little farther from the glass gh than its focus; because, when they entered the glass, their axes were almost parallel, as coming through the object-glass at the point k, to whose distance the breadth of the eye-glass in a long telescope bears very small proportion. So that the place of the eye will be nearly at the focal distance of the eye-glass, and the rays of each respective pencil being parallel among themselves, and their axes crossing each other in a larger angle than they would do if the object were to be seen by the naked eye, vision will be distinct, and the object will appear magnified.

The power of magnifying in this telescope is as the focal length of the object-glass to the focal length of the eye-glass.

Dem. In order to prove this, we may consider the angle AkB as that under which the object would be seen by the naked eye; for, in considering the distance of the object, the length of the telescope may be omitted, as bearing no proportion to it. Now the angle under which the object is seen by means of the telescope is geh, which is to the other AkB, or its equal gkh, as the distance from the centre of the object-glass to that of the eye-glass. The angle, therefore, under which an object appears to an eye assisted by a telescope of this kind, is to that under which it would be seen without it, as the focal length of the object-glass to the focal length of the eye-glass.

It is evident from the figure, that the visible area or space which can be seen at one view when we look through this telescope, depends on the breadth of the eye-glass, and not of the object-glass; for if the eye-glass be too small to receive the rays gm, ph, the extremities of the object could not have been seen at all: a larger breadth of the object-glass conduces only to the rendering each point of the image more luminous by receiving a larger pencil of rays from each point of the object.

It is in this telescope as in the compound microscope, where we see, when we look through it, not the object itself, but only an image of it at C E D: now that image being inverted with respect to the object, as it is, because the axes of the pencils that flow from the object cross each other at k, objects seen through a telescope of this kind necessarily appear inverted.

This is a circumstance not at all regarded by astronomers: but for viewing objects upon the earth, it is convenient that the telescope should represent them in their natural posture; to which use the telescope with three eye-glasses as represented, fig. 2, is peculiarly adapted, and the progress of the rays through it from the object to the eye is as follows:

AB is the object sending out the several pencils *A c d*, *B c d*, &c. which passing through the object-glass *c d*, are collected into their respective foci in C D, where they form an inverted image. From hence they proceed to the first eye-glass *e s*, whose focus being at *l*, the rays of each pencil are rendered parallel among themselves, and their axes, which were nearly parallel before, are made to converge and cross each other: the second eye-glass *g h*, being so placed that its focus shall fall upon *m*, renders the axes of the pencils which diverge from thence parallel, and causes the rays of each, which were parallel among themselves, to meet again at its focus E F on the other side, where they form a second image, inverted with respect to the former, but erect with respect to the object. Now this image being seen by the eye at *a b* through the eye-glass *i k*, affords a direct representation of the object, and under the same angle that the first image C D would have appeared, had the eye been placed at *l*, supposing the eye-glasses to be of equal convexity; and therefore the object is seen equally magnified in this as in the former telescope, that is, as the focal distance of the object-glass to that of any one of the eye-glasses, and appears erect.

If a telescope exceeds 20 feet, it is of no use in viewing objects upon the surface of the earth; for if it magnifies above 90 or 100 times, as those of that length usually do, the vapours which continually float near the earth in great plenty, will be so magnified as to render vision obscure.

2. The Galilean telescope with the concave eye-glass is constructed as follows:

A B (pl. 168, fig. 3.) is an object sending forth the pencils of rays *g h i*, *k l m*, &c. which, after passing through the object-glass *c d*, tend towards *e* E *f* (where we will suppose the focus of it to be), in order to form an inverted image there as before; but in their way to it, are made to pass through the concave glass *n o*, so placed that its focus may fall upon E, and consequently the rays of the several pencils which were converging towards those respective focal points *e*, E, *f*, will be rendered parallel among themselves: but the axes of those pencils crossing each other at F, and diverging from thence, will be rendered more diverging, as represented in the figure. Now these rays entering the pupil of an eye, will form a large and distinct image *a b* upon the retina, which will be inverted with respect to the object, because the axis of the pencils cross in F. The object of course will be seen erect, and the angle under which it will appear will be equal to that which the lines *a* F, *b* F, produced back through the eye-glass, form at F.

It is evident, that the less the pupil of the eye is, the less is the visible area seen through a telescope of this kind; for a less pupil would exclude such pencils as proceed from the extremities of the object A B, as is evident from the figure. This is an inconvenience that renders this telescope unfit for many uses; and is only to be remedied by the telescope with the convex eye-glasses, where the rays which form the extreme parts of the image are brought together in order to enter the pupil of the eye, as explained above.

It is apparent also, that the nearer the eye is placed to the eye-glass of this telescope, the larger is the area seen through it; for, being placed close to the glass, as in the figure, it admits rays that come from A and B, the extremities of the object, which it could not if it was placed farther off.

The degree of magnifying in this telescope is in the same proportion with that in the other, viz. as the focal distance of the object-glass is to the focal distance of the eye-glass.

For there is no other difference but this, viz. that as the extreme pencils in that telescope were made to converge and form the angle *g e h*, fig. 1, or *i n k*, fig. 2, these are now made to diverge and form the angle *a* F *b*, fig. 3; which angles, if the concave glass in one has an equal refractive power with the convex one in the other, will be equal, and therefore each kind will exhibit the object magnified in the same degree.

There is a defect in all these kinds of telescopes, not to be remedied in a single lens by any means whatever, which was thought only to arise from hence, viz. that spherical glasses do not collect rays to one and the same point. But it was happily discovered by sir Isaac Newton, that the imperfection of this sort of telescope, so far as it arises from the spherical form of the glasses, bears almost no proportion to that which is owing to the different refrangibility of light. This diversity in the refraction of rays is about a 28th part of the whole; so that the object-glass of a telescope cannot collect the rays which flow from any one point in the object into a less room than the circular space whose diameter is about the 56th part of the breadth of the glass.

To shew this, let A B, fig. 4, represent a convex lens, and let C D F be a pencil of rays flowing from the point D; let H be the point at which the least refrangible rays are collected to a focus; and I, that where the most refrangible concur. Then, if I H be the 28th part of E H, I K will be a proportionable part of E C (the triangles H I K and H E C being similar): consequently L K will be the 28th part of F C. But M N will be the least space into which the rays will be collected, as appears by their progress represented in the figure. Now M N is but about half of K L; and therefore it is about the 56th part of C F: so that the diameter of the space into which the rays are collected will be about the 56th part of the breadth of that part of the glass through which the rays pass; which was to be shewn.

Since therefore each point of the object will be represented in so large a space, and the centres of those spaces will be contiguous, because the points in the object the rays flow from are so; it is evident, that the image of an object made by such a glass must be a most confused representation, though it does not appear so when viewed through an eye-glass that magnifies in a moderate degree; consequently the degree of magnifying in the eye-glass must not be too great with respect to that of the object-glass, lest the confusion become sensible.

Notwithstanding this imperfection, a dioptrical telescope may be made to magnify in any given degree, provided it be of sufficient length; for the greater the focal distance of the object-glass is, the less may be the proportion which the focal distance of the eye-glass may bear to that of the object-glass, without rendering the image obscure. Thus, an object-glass, whose focal distance is about four feet, will admit of an eye-glass whose focal distance shall be little more than an inch, and consequently will magnify almost 48 times;

TELESCOPE.

Fig.1.

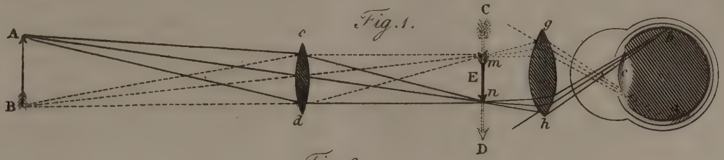


Fig.2.

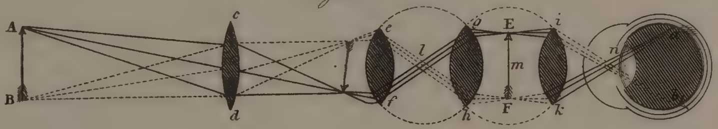


Fig.3.

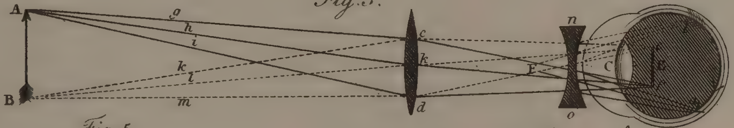


Fig.5.

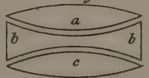


Fig.4.

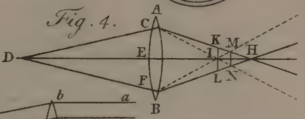


Fig.6.

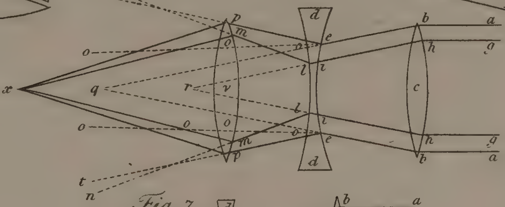


Fig.7.

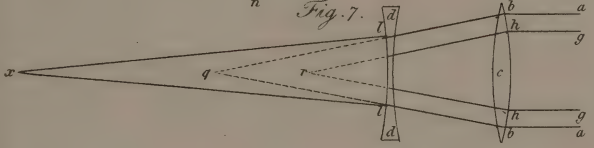


Fig.10.

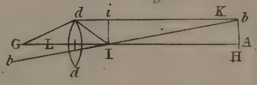


Fig.8.

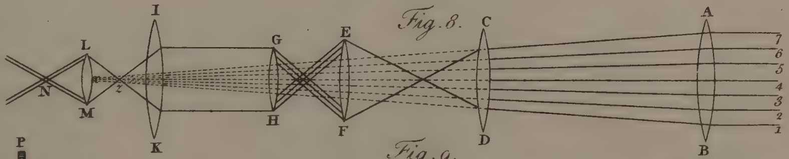


Fig.9.

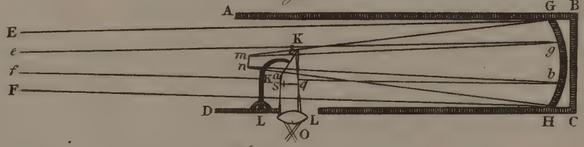
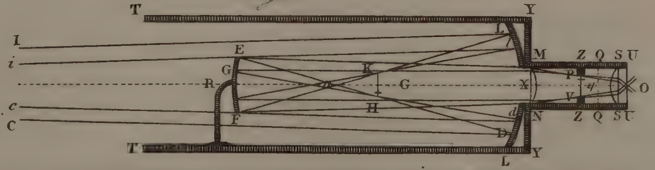


Fig.11.



Mutlow sc Russell Co.t

London. Published by Sherwood & Co Paternoster Row Mar. 1. 1813.

but an object-glass of 40 feet focus will admit of an eye-glass of only four inches focus, and will therefore magnify 120 times; and an object-glass of 100 feet focus will admit of an eye-glass of little more than six inches focus, and will therefore magnify almost 200 times.

The reason of this disproportion in their several degrees of magnifying is to be explained in the following manner:—Since the diameter of the spaces, into which rays flowing from the several points of an object are collected, are as the breadth of the object-glass, it is evident that the degree of confusedness in the image is as the breadth of that glass; for the degree of confusedness will only be as the diameters or breadths of those spaces, and not as the spaces themselves. Now the focal length of the eye-glass, that is, its power of magnifying, must be as that degree; for, if it exceeds it, it will render the confusedness sensible; and therefore it must be as the breadth or diameter of the object-glass. The diameter of the object-glass, which is as the square root of its aperture or magnitude, must be as the square root of the power of magnifying in the telescope; for unless the aperture itself be as the power of magnifying, the image will want light: the square root of the power of magnifying will be as the square root of the focal distance of the object-glass; and therefore the focal distance of the eye-glass must be only as the square root of that of the object-glass. So that in making use of an object-glass of a longer focus, suppose, than one that is given, you are not obliged to apply an eye-glass of a proportionably longer focus than what would suit the given object-glass, but such an one only whose focal distance shall be to the focal distance of that which will suit the given object-glass, as the square root of the focal length of the object-glass you make use of, is to the square root of the focal length of the given one. And this is the reason that longer telescopes are capable of magnifying in a greater degree than shorter ones, without rendering the object confused or coloured.

3. But the inconveniency of very long telescopes is so great, that different attempts have been made to remove it. Of these, the most successful have been by Dollond and Blair; and the general principles upon which these eminent opticians proceeded have been mentioned in our article ACHROMATIC. It may be sufficient to observe, in addition to what has been already said, that the object-glasses of Blair's telescopes are composed of three distinct lenses, two convex and one concave; of which the concave one is placed in the middle, as is represented in fig. 5, where *a* and *c* shew the two convex lenses, and *b b* the concave one, which is by the British artists placed in the middle. The two convex ones are made of London crown glass, and the middle one of white flint glass; and they are all ground to spheres of different radii, according to the refractive powers of the different kinds of glass and the intended focal distance of the object-glass of the telescope. According to Boscovich, the focal distance of the parallel rays for the concave lens is one-half, and for the convex glass one-third of the combined focus. When put together, they refract the rays in the following manner. Let *a b*, *a b*, fig. 6, be two red rays of the sun's light falling parallel on the first convex lens *c*. Supposing there was no other lens present but that one, they would then be converged into the lines *b e*, *b e*, and at last meet in the focus *q*. Let the lines *g h*, *g h*, represent two violet rays falling on the surface of the lens. These are also refracted, and will meet in a focus; but as they have a greater degree of refrangibility than the red rays, they must of consequence converge more by the same power of refraction in the glass, and meet sooner in a focus, suppose at *r*. —Let now the concave lens *d d* be placed in such a manner as to intercept all the rays before they come to their focus. Were this lens made of the same materials, and ground to the same radius with the convex one, it would have the same power to cause the rays to diverge that the former had to make them converge. In this case, the red rays would become parallel, and move on in the line *o o*, *o o*: but the concave lens, being made of flint glass, and upon a shorter radius, has a greater refractive power, and therefore they diverge a little after they come out of it; and if no third lens was interposed, they would proceed diverging in the lines *o p t*, *o p t*; but, by the interposition of the third lens *o v o*, they are again made to converge, and meet in a focus somewhat more distant than the former, as at *x*. By the concave lens the violet rays are also refracted, and made to diverge: but having a greater degree of refrangibility, the same power of refraction makes them diverge somewhat more than the red ones; and thus, if no third lens was interposed, they would proceed in such lines as *l m n*, *l m n*. Now, as the differently coloured rays fall upon the third lens with different degrees of divergence, it is plain, that the same power of refraction in that lens will operate upon them in such a manner as to bring them altogether to a focus very nearly at the same point. The red rays, it is true, require the greatest power of refraction to bring them to a focus; but they fall upon the lens with the least degree of divergence. The violet rays, though they require the least power of refraction, yet have the greatest degree of divergence; and thus all meet together at the point *x*, or very nearly so.

But though we have hitherto supposed the refraction of the concave lens to be greater than that of the convex ones, it is easy to see how the errors occasioned by the first lens may be corrected by it, though it should have even a less power of refraction than the convex one. Thus, let *a b*, *a b*, fig. 7, be two rays of red light falling upon the convex lens *c*, and refracted into the focus *q*; let also *g h*, *g h*, be two violet rays converged into a focus at *r*; it is not necessary, in order to their convergence into a common focus at *x*, that the concave lens should make them diverge: it is sufficient if the glass has a power of dispersing the violet rays somewhat more than the red ones: and many kinds of glass have this power of dispersing some kinds of rays, without a very great power of refraction. It is better, however, to have the object-glass composed of three lenses; because there is then another correction of the aberration by means of the third lens; and it might be impossible to find two lenses, the errors of which would exactly correct each other. It is also easy to see, that the effect may be the same whether the concave glass is a portion of the same sphere with the others or not; the effect depending upon a combination of certain circumstances, of which there is an infinite variety.

By means of this correction of the errors arising form the different refrangibility of the rays of light, it is possible to shorten dioptric telescopes considerably, and yet leave them equal magnifying powers. The reason of this is, that the errors arising from the object-glass being removed, those which are occasioned by the eye-glass are inconsiderable: for the error is always in proportion to the length of the focus in any glass; and in very long telescopes it becomes exeedingly great, being no less than $\frac{1}{28}$th of the whole; but in glasses of a few inches focus it becomes trifling. Refracting telescopes, which go by the name of Dollond's, are therefore now constructed in the following manner. Let A B, fig. 8, represent an object-glass composed of three lenses as above described, and converging the rays 1, 2, 3, 4, &c. to a very distant focus, as at *x*. By means of the interposed lens C D, however, they are converged to one much nearer, as at *y*, where an image of the object is formed. The rays diverging from thence fall upon another lens E F, where the pencils are rendered parallel, and an eye placed near that lens would see the object magnified and very distinct. To enlarge the magnifying power still more, however, the pencils thus become parallel are made to fall upon another at G H; by which they are again made to converge to a distant focus: but, being intercepted by the lens I K, they are made to meet at the nearer one *z*; whence diverging to L M, they are again rendered parallel, and the eye at N sees the object very distinctly.

From an inspection of the figure it is evident, that Dollond's telescope thus constructed is in fact two telescopes combined together; the first ending with the lens E F, and the second with LM. In the first we do not perceive the object itself, but the image of it formed at *y*; and in the second we perceive only the image of that image formed at *z*. Nevertheless, such telescopes are exceedingly distinct, and represent objects so clearly as to be preferred, in viewing terrestrial things, even to reflectors themselves. The latter indeed have greatly the advantage in their powers of magnifying, but they are much deficient in point of light. Much more light is lost by reflection than by refraction: and as in these telescopes the light must unavoidably suffer two reflections, a great deal of it is lost; nor is this loss counterbalanced by the greater aperture which these telescopes will bear, which enables them to receive a greater quantity of light than the refracting ones. The metals of reflecting telescopes also are very much subject to tarnish, and require much more dexterity to clean them than the glasses of refractors; which makes them more troublesome and expensive, though for making discoveries in the celestial regions, they are undoubtedly the only proper instruments which have been hitherto constructed.

II. *The Reflecting Telescope.*

The inconveniences arising from the great length of refracting telescopes, before Dollond's discovery, are sufficiently obvious; and these, together with the difficulties occasioned by the different refrangibility of light, induced sir Isaac Newton to turn his attention to the subject of reflection, and endeavour to realize the ideas of himself and others concerning the possibility of constructing telescopes upon that principle.—The instrument which he contrived is represented, fig. 9, where A B C D is a large tube, open at A D and closed at B C, and of a length at least equal to the distance of the focus from the metallic spherical concave speculum G H placed at the end B C. The rays E G, F H, &c. proceeding from a remote object P R, intersect one another somewhere before they enter the tube, so that E G, *e g*, are those that come from the lower part of the object, and *f h*, F H, from its upper part: these rays, after falling on the speculum G H, will be reflected, so as to converge and meet in *m n*, where they will form a perfect image of the object.—But as this image cannot be seen by the spectator, they are intercepted by a small plane metallic speculum K K, intersecting the axis at an angle of 45°, by which the rays tending to *m n* will be reflected towards a hole L L in the side of the tube, and the image of the object will thus be formed in *q* S: which image will be less distinct, because some of the rays which would otherwise fall on the concave speculum G H, are intercepted by the plane speculum: nevertheless it will appear in a considerable degree distinct, because the aperture A D of the tube, and the speculum G H are large. In the lateral hole L L is fixed a convex lens, whose focus is at S *q*; and therefore this lens will refract the rays that proceed from any point of the image, so as at their exit they will be parallel, and those that proceed from the extreme points S *q* will converge after refraction, and form an angle at O, where the eye is placed; which will see the image S *q*, as if it were an object, through the lens L L; consequently the object will appear enlarged, inverted, bright, and distinct. In L L lenses of different convexities may be placed, which, by being moved nearer to the image or farther from it, would represent the object more or less magnified, provided that the surface of the speculum G H be of a perfectly spherical figure. If, in the room of one lens L L, three lenses be disposed in the same manner with the three eye-glasses of the refracting telescope, the object will appear erect, but less distinct than when it is observed with one lens. On account of the position of the eye in this telescope, it is extremely difficult to direct the instrument towards any object. Huygens, therefore, first thought of adding to it a small refracting telescope, the axis of which is parallel to that of the reflector. This is called a finder, or director. The Newtonian telescope is also furnished with a suitable apparatus for the commodious use of it.

In order to determine the magnifying power of this telescope, it is to be considered that the plane speculum K K is of no use in this respect. Let us then suppose, that one ray proceeding from the object coincides with the axis G L I A, fig. 10, of the lens and speculum; let *b b* be another ray proceeding from the lower extreme of the object, and passing through the focus I of the speculum K H: this will be reflected in the direction *b i d*, parallel to the axis G L A, and falling on the lens *d* L *d*, will be refracted to G; so that G L will be equal to L I, and $d\mathrm{G} = d\mathrm{I}$. To the naked eye the object would appear under the angle $\mathrm{I}bi = b\mathrm{IA}$; but by means of the telescope it appears under the angle $d\mathrm{GL} = d\mathrm{IL} = \mathrm{I}di$: and the angle I *d i* is to the angle $\mathrm{I}bi :: b\mathrm{I} : \mathrm{I}d$; consequently the apparent magnitude by the telescope is to that by the naked eye as the distance of the focus of the speculum from the speculum, to the distance of the focus of the lens from the lens.

The Newtonian telescope was still inconvenient. Notwithstanding the contrivance of Huygens, objects were found by it with difficulty. The telescope of James Gregory, therefore, soon obtained the preference, to which, for most purposes, it is justly intitled, as the reader will perceive from the following construction.

Let T Y Y T, fig. 11, pl. 168, be a brass tube, in which L *l d* D is a metallic concave speculum, perforated in the middle at X; and E F a less concave mirror, so fixed by the arm or strong wire RT, which is moveable by means of a long screw on the outside of the tube, as to be moved nearer to or farther from the larger speculum L *l d* D, its axis being kept in the same line with that of the great one. Let A B represent a very remote object, from each part of which issue pencils of rays e. g. *c d*, C D, from A the upper extreme of the object, and I L, *i l*, from the lower part B; the rays I L, CD, from the extremes crossing one another before they enter the tube. These rays falling upon the larger mirror L D, are reflected from it into the focus K H, where they form an inverted image of the object A B, as in the Newtonian telescope. From this image the rays, issuing as from an object, fall upon the small mirror EF, the centre of which is at *e*; so that after reflection they would meet in their foci at Q Q, and there form an erect image. But since an eye at that place could see but a small part of an object, in order to bring rays from more distant parts of it into the pupil, they are intercepted by the plano-convex lens M N, by which means a smaller erect image is formed at P V, which is viewed through the meniscus S S by an eye at O. This meniscus both makes the rays of each pencil parallel, and magnifies the image P V. At the place of this image all the foreign rays are intercepted by the perforated partition Z Z. For the same reason the hole near the eye O is very narrow. When nearer objects are viewed by this telescope, the small speculum E F is removed to a greater distance from the larger L D, so that the second image may be always formed in P V; and this distance is to be adjusted (by means of the screw on the outside of the great tube) according to the form of the eye of the spectator. It is also necessary, that the axis of the telescope should pass through the middle of the speculum E F, and its centre, the centre of the speculum L L, and the middle of the hole X, the centres of the lenses M N, S S, and the hole near O. As the hole X in the speculum L L can reflect none of the rays issuing from the object, that part of the image which corresponds to the middle of the object must appear to the observer more dark and confused than the extreme parts of it. Besides, the speculum E F will also intercept many rays proceeding from the object; and therefore, unless the aperture T T be large, the object must appear in some degree obscure.

In the best reflecting telescopes, the focus of the small mirror is never coincident with the focus of the great one, where the first image K H is formed, but a little beyond it (with respect to the eye), as at *n*; the consequence of which is, that the rays of the pencils will not be parallel after reflection from the small mirror, but converge so as to meet in points about Q *q* Q, where they would form a larger upright image than P V, if the glass R was not in their way; and this image might be viewed by means of a single eye-glass properly placed between the image and the eye: but then the field of view would be less, and consequently not so pleasant; for which reason, the glass R is still retained, to enlarge the scope or area of the field.

To find the magnifying power of this telescope, multiply the focal distance of the great mirror by the distance of the small mirror from the image next the eye, and multiply the focal distance of the small mirror by the focal distance of the eye-glass; then divide the product of the former multiplication by the product of the latter, and the quotient will express the magnifying power.

One great advantage of the reflecting telescope is, that it will admit of an eye-glass of a much shorter focal distance than a refracting telescope will, and consequently it will magnify so much the more; for the rays are not coloured by reflection from a concave mirror, if it be ground to a true figure, as they are by passing through a convex glass, let it be ground ever so true.

The nearer an object is to the telescope, the more its pencils of rays will diverge before they fall upon the great mirror, and therefore they will be the longer of meeting in points after reflection; so that the first image K H will be formed at a greater distance from the large mirror, when the object is near the telescope, than when it is very remote. But as this image must be formed farther from the small mirror than its principal focus *n*, this mirror must be always set at a greater distance from the large one, in viewing near objects, than in viewing remote ones. And this is done by turning the screw on the outside of the tube, until the small mirror be so adjusted that the object (or rather its image) appears perfect.

In looking through any telescope towards an object, we never see the object itself, but only that image of it which is formed next the eye in the telescope. For if a man holds his finger or a stick between his bare eye and an object, it will hide part, if not the whole, of the object from his view: but if he ties a stick across the mouth of a telescope before the object-glass, it will hide no part of the imaginary object he saw through the telescope before, unless it covers the whole mouth of the tube: for all the effect will be, to make the object appear dimmer, because it intercepts part of the rays. Whereas, if he puts only a piece of wire across the inside of the tube, between the eye-glass and his eye, it will hide part of the object which he thinks he sees; which proves, that he sees not the real object, but its image. This is also confirmed by means of the small mirror E F, in the reflecting telescope, which is made of opaque metal, and stands directly between the eye and the object towards which the telescope is turned; and will hide the whole object from the eye at O, if the two glasses Z Z and S S are taken out of the tube.

Great improvements have been lately made in the construction of both reflecting and refracting telescopes, as well as in the method of applying those instruments to the purposes for which they are intended.

To describe all the varieties of shape and accommodation which may be given to a telescope, would be a task as trifling as prolix. The artists of London and of Paris have racked their inventions to please every fancy, and to suit every purpose. We shall content ourselves with a few general maxims, deduced from the scientific consideration of a telescope, as an instrument by which the visual angle subtended by a distinct object is greatly magnified.

The chief consideration is to have a steady view of the distant object. This is unattainable, unless the axis of the instrument be kept constantly directed to the same point of it: for when the telescope is gently shifted from its position, the object seems to move in the same or in the opposite direction, according as the telescope inverts the object or shews it erect. This is owing to the magnifying power, because the apparent angular motion is greater than what we naturally connect with the motion of the telescope. This does not happen when we look through a tube without glasses.

All shaking of the instrument therefore makes the object dance before the eye; and this is disagreeable, and hinders us from seeing it distinctly. But a tremulous motion, however small, is infinitely more prejudicial to the performance of a telescope, by making the object quiver before us. A person walking in the room prevents us from seeing distinctly; nay, the very pulsation in the body of the observer agitates the floor enough to produce this effect, when the telescope has a great magnifying power: for the visible motion of the object is then an imperceptible tremor, like that of an harpsichord wire, which produces an effect precisely similar to optical indistinctness; and every point of the object is diffused over the whole space of the angular tremor, and appears co-existent in every part of this space, just as a harpsichord wire does while it is sounding. The more rapid this motion is, the indistinctness is the more complete. Therefore the more firm and elastic, and well bound together, the frame-work and apertures of our telescope is, the more hurtful will this consequence be. A mounting of lead, were it practicable, would be preferable to wood, iron, or brass. This is one great cause of the indistinctness of the very finest reflecting telescopes of the usual constructions, and can never be totally removed. In the Gregorian form, it is hardly possible to damp the elastic tremor of the small speculum, carried by an arm supported at one end only, even though the tube were motionless. We were witnesses of a great improvement made on a four-feet reflecting telescope, by supporting the small speculum by a strong plate of lead placed across the tube, and led by an adjusting screw at each end. But even the great mirror may vibrate enough to produce indistinctness. Refracting telescopes are free from this inconveniency, because a small angular motion of the object-glass round one of its own diameters has no sensible effect on the image in its focus. They are affected only by an angular motion of the axis of the telescope or of the eye-glasses.

This single consideration gives us great help towards judging of the merits of any particular apparatus. We should study it in this particular, and see whether its form makes the tube readily susceptible of such tremulous motions. If it does, the firmer it is, and the more elastic it is, the worse. All forms, therefore, where the tube is supported only near the middle, or where the whole immediately or remotely depends on one narrow joint, are defective.

Reasoning in this way, we say with confidence, that of all the forms of a telescope apparatus, the old fashioned simple stand, represented in pl. 169, fig. 1, is by far the best, and that others are superior according as the disposition of the points of support of the tube approaches to this. Let the pivots A, B, be fixed in the lintel and sole of a window. Let the four braces terminate very near to these pivots. Let the telescope lie on the pin F*f*, resting on the shoulder round the eye-piece, while the far end of it rests on one of the pins 1, 2, 3, &c.; and let the distance of these pins from F very little exceed the length of the telescope. The trembling of the axis, even when considerable, cannot affect the position of the tube, because the braces terminate almost at the pivots. The tremor of the brace C D does as little harm, because it is nearly perpendicular to the tube. And if the object-glass were close at the upper supporting pin, and the focus at the lower pin F, even the bending and trembling of the tube will have no effect on its optical axis. The instrument is only subject to horizontal tremors. These may be almost annihilated by having a slender rod coming from a hook's joint in the side of the window, and passing through such another joint close by the pin F. We have seen an instrument of this form, having A B parallel to the earth's axis. The whole apparatus did not cost fifty shillings, and we find it not in the least sensible manner affected by a storm of wind. It was by observations with this instrument that the tables of the motions of the Georgium Sidus, published in the Edinburgh Transactions, were constructed. This is an excellent equatorial.

But this apparatus is not portable, and it is sadly deficient in elegance. The following is the best method we have seen of combining these circumstances with the indispensable requisites of a good telescope.

The pillar V X, fig. 2, rises from a firm stand, and has a horizontal motion round a cone which completely fills it. This motion is regulated by a rack-work in the box at V. The screw of this rack-work is turned by means of the handle P, of a convenient length, and the screw may be disengaged by the click or detent V, when we would turn the instrument a great way at once. The telescope has a vertical motion round the joint Q placed near the middle of the tube. The lower end of the tube is supported by the stay O T. This consists of a tube R T, fastened to the pillar by a joint T, which allows the stay to move in a vertical plane. Within this tube slides another, with a stiff motion. This tube is connected with the telescope by another joint O, also admitting motion in a vertical plane. The side M of this inner tube is formed into a rack, in which works a pinion fixed to the top of the tube R T, and turned by the flat finger-piece R. The reader will readily see the advantages and the remaining defects of this apparatus. It is very portable, because the telescope is easily disengaged from it, and the legs and stay fold up. If the joint Q were immediately under A, it would be much freer from all tremor in the vertical plane. But nothing can hinder other tremors arising from the long pillar and the three springy legs. These communicate all external agitations with great vigour. The instrument should be set on a stone pedestal, or, what is better, a cask filled with wet sand. This pedestal, which necessity perhaps suggested to our scientific navigators, is the best that can be imagined.

Fig. 3 is the stand usually given to reflecting telescopes. The vertical tube FBG is fastened to the tube by finger screws, which pass through the slits at F and G. This arch turns round a joint in the head of the divided pillar, and has its edge cut into an oblique rack, which is acted on by the horizontal screw, furnished with the finger-piece A. This screw turns in a horizontal square frame. This frame turns round a horizontal joint in the off-side, which cannot be seen in this view. In the side of this frame next the eye there is a finger-screw *a*, which passes through the frame, and presses on the round horizontal plate D. By screwing down this finger-screw, the frame is brought

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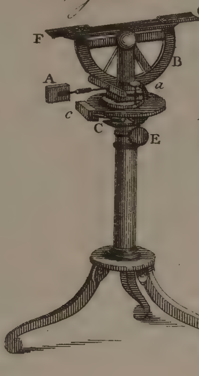
PL.169

Fig. 3.



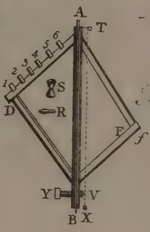


Fig. 1.

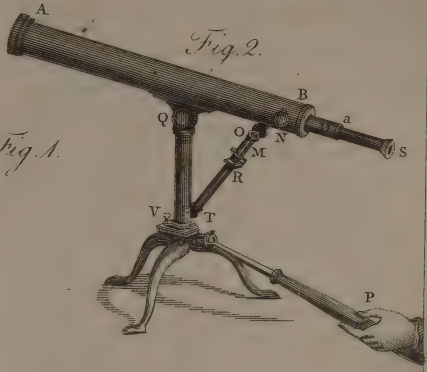
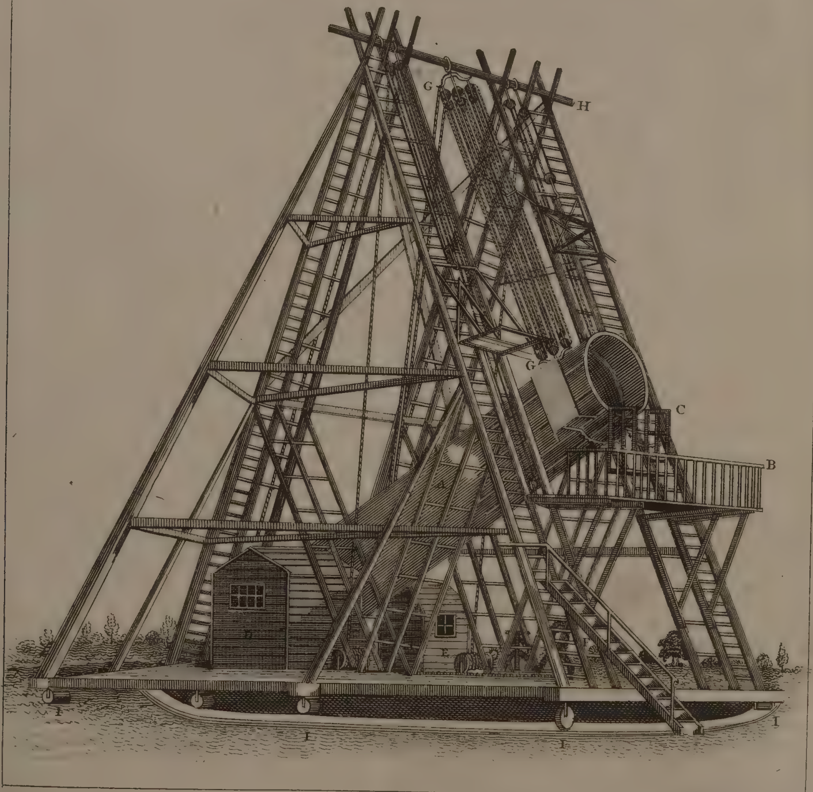


Fig. 2.

Herschel's Grand Telescope!



Mutlow, Sc. Ruſsell Co.t

London, Published by Sherwood & Co. Paternoster Row, March 1, 1813.

up, and presses the horizontal screw to the rack. Thus the elevation of the telescope is fixed, and may be nicely changed by the finger applied to A and turning this screw. The horizontal round plate D moves stiffly round on another plate of nearly equal diameter. This under plate has a deep conical hollow socket, which is nicely fitted by grinding to a solid cone formed on the top of the great upright pillar, and they may be firmly fixed in any position by the finger-screw E. To the under plate is fastened a box *c*, containing a horizontal screw C, which always works in a rack cut in the edge of the upper plate, and cannot be disengaged from it. When a great vertical or horizontal motion is wanted, the screws *a* and E are slacked, and by tightening them the telescope may be fixed in any position, and then any small movements may be given it by the finger-plates A and C.

This stand is very subject to brisk tremor, either from external agitation of the pedestal, or from the immediate action of the wind; and we have seldom seen distinctly through telescopes mounted in this manner, till one end of the tube was pressed against something that was very steady and unelastic. It is quite astonishing what a change this produces. We took a very fine telescope made by James Short, and laid the tube on a great lump of soft clay, pressing it firmly down into it. Several persons, ignorant of our purpose, looked through it, and read a table of logarithms at the distance of 310 yards. We then put the telescope on its stand, and pointed it to the same object; none of the company could read at a greater distance than 235 yards, although they could perceive no tremor. They thought the vision as sharp as before; but the incontrovertible proof of the contrary was, that they could not read at such a distance.

If the round plates were of much greater dimensions; and if the lower one, instead of being fixed to the pillar, were supported on four stout pillars standing on another plate; and if the vertical arch had a horizontal axis turning on two upright frames firmly fixed to the upper plate;—the instrument would be much freer from tremor. Such stands were made formerly; but being much more bulky and inconvenient for package, they have gone into disuse.

The high magnifying powers of Dr. Herschel's telescopes made all the usual apparatus for their support extremely imperfect. But his judgment, and his ingenuity and fertility in resource, are as eminent as his philosophical ardour. He has contrived for his reflecting telescopes stands which have every property that can be desired. The tubes are all supported at the two ends. The motions, both vertical and horizontal, are contrived with the utmost simplicity and firmness. We cannot more properly conclude this article than with a description of his 40 feet telescope, the noblest monument of philosophical zeal and of princely munificence that the world can boast of.

In plate 169, we have given a view of this noble instrument in a meridional situation, as it appears when seen from a convenient distance by a person placed to the south-west of it. The foundation in the ground consists of two concentric circular brick walls, the outermost of which is 42 feet in diameter, and the inside one 21 feet. They are two feet six inches deep under ground; two feet three inches broad at the bottom, and one foot two inches at the top; and are capped with paving stones about three inches thick, and twelve and three quarters broad. The bottom frame to the whole apparatus rests upon these two walls by twenty concentric rollers III, and is moveable upon a pivot, which gives a horizontal motion to the whole apparatus, as well as to the telescope.

The tube of the telescope A, though very simple in its form, which is cylindrical, was attended with great difficulties in the construction. This is not to be wondered at, when its size, and the materials of which it is made, are considered. Its length is 39 feet four inches; it measures four feet ten inches in diameter; and every part of it is of iron. Upon a moderate computation, the weight of a wooden tube must have exceeded an iron one at least 3000 pounds; and its durability would have been far inferior to that of iron. It is made of rolled or sheet iron, which has been joined together without rivets, by a kind of seaming well known to those who make iron funnels for stoves.

Very great mechanical skill is used in the contrivance of the apparatus by which the telescope is supported and directed. In order to command every altitude, the point of support is moveable; and its motion is effected by mechanism, so that the telescope may be moved from its most backward point of support to the most forward, and, by means of the pulleys G G suspended from the great beam H, be set to any altitude, up to the very zenith. The tube is also made to rest with the point of support in a pivot, which permits it to be turned sidewise.

The concave face of the great mirror is 48 inches of polished surface in diameter. The thickness, which is equal in every part of it, remains now about three inches and a half; and its weight, when it came from the cast, was 2118 pounds, of which it must have lost a small quantity in polishing. To put this speculum into the tube, it is suspended vertically by a crane in the laboratory, and placed on a small narrow carriage, which is drawn out, rolling upon planks, till it comes near the back of the tube; here it is again suspended and placed in the tube by a peculiar apparatus.

The method of observing by this telescope is by what Dr. Herschel calls the front view; the observer being placed in a seat C, suspended at the end of it, with his back towards the object he views. There is no small speculum, but the magnifiers are applied immediately to the first focal image.

From the opening of the telescope, near the place of the eye-glass, a speaking pipe runs down to the bottom of the tube, where it goes into a turning joint; and after several other inflections, it at length divides into two branches, one going into the observatory D, and the other into the work-room E. By means of the speaking pipe the communications of the observer are conveyed to the assistant in the observatory, and the workman is directed to perform the required motions.

In the observatory is placed a valuable sidereal time-piece, made by Mr. Shelton. Close to it, and of the same height, is a polar distance-piece, which has a dial-plate of the same dimensions with the time-piece: this piece may be made to shew polar distance, zenith distance, declination, or altitude, by setting it differently. The time and polar distance pieces are placed so that the assistant sits before them at a table, with the speaking-pipe rising between them; and in this manner observations may be written down very conveniently.

This noble instrument, with proper eye-glasses, magnifies above 6000 times, and is the largest that has ever been made. Such of our readers as wish for a fuller account of the machinery attached to it, viz. the stairs, ladders, and platform B, may have recourse to the second part of the Transactions of the Royal Society for 1795; in which, by means of 18 plates and 63 pages of letter-press, an ample detail is given of every circumstance relating to joiner's work, carpenter's work, and smith's work, which attended the formation and erection of this telescope. It was completed on August the 28th, 1789, and on the same day was the sixth satellite of Saturn discovered.

The doctor has some other excellent instruments of smaller power placed in his garden at Slough, and by means of which most of his discoveries have been made.

There are however two useful appendages to telescopes, which deserve to be briefly described. A finder, viz. a short telescope, is generally affixed to the tube of a large telescope, for the purpose of finding out an object expeditiously. This finder does not magnify the object more than four, six, or eight times; but it has a great field of view, so that through it a great part of the heavens may be seen at once. In the inside of its tube, and exactly at the focus of the eye-glass, there are two slender wires, which cross each other in the axis of the telescope. Now the finder is adjusted by means of screws upon the tube of the great telescope, in such a manner as that when an object, seen through the finder, appears to be near the crossing of the above-mentioned wires, it is at the same time visible through the great telescope: hence, when the observer wishes to view a small distant object, as a star, a planet, &c. he moves the instrument to one side or the other, until, by looking through the finder, he brings the object nearly to coincide with the crossing of the wires, and when that takes place, he immediately looks through the large telescope, &c.

A micrometer is an instrument which is used with a telescope, for the purpose of measuring small angles. A great variety of micrometers have been contrived by various ingenious persons; and they are more or less complicated, more or less expensive, as also more or less accurate. See MICROMETER.

We have in this article, and under the word ACHROMATIC, described the nature and principle of Dollond's improvements. But we cannot entirely quit this branch of the subject without briefly noticing an ingenious suggestion of Mr. Nicholson's for improving the achromatic telescope, by adding an artificial iris to the object-glass. Suppose, says he, a brass ring to surround the object end of the telescope, and upon this let eight or more triangular slips of brass be fixed, so as to revolve on equi-distant pins passing through each triangle near one of its corners. If the triangles be slided inwards upon each other, it may readily be apprehended that they will close the aperture; and if they be all made to revolve or slide backwards alike, it is clear that their edges will leave an octagonal aperture, greater or less according to circumstances. The equable motion of all the triangles may be produced either by pinions and one concave toothed wheel, or by what is called snail-work. Another kind of iris, more compact, may be made, by causing thin elastic slips of brass to slide along parallel to the tube, and be conducted each through a slit in a brass cap which shall lead them across the aperture in a radial direction. It is probable also that the artist, who shall carry these hints into effect, may also think of several other methods.

This thought occurred to the author, from contemplating the contraction and dilatation of the iris of the eye, according as we look at an object more or less luminous. These variations are so great, that in the observable variations of the human eye, the aperture is thirty times as large at one time as at another, whilst in the cat the proportion is greater than a hundred to one.

We cannot enter into any description of the ingenious inventions of Adams, Brewster, Greene, &c. but must conclude this article with some observations.

On the different Merits of Microscopes and Telescopes, compared with one another; how far we may reasonably depend on the Discoveries made by them, and what hopes we may entertain of further Improvements.

The advantages arising from the use of microscopes and telescopes depend, in the first place, upon their property of magnifying the minute parts of objects, so that they can by that means be more distinctly viewed by the eye; and, secondly, upon their throwing more light into the pupil of the eye than what is done without them. The advantages arising from the magnifying power would be extremely limited, if they were not also accompanied by the latter: for if the same quantity of light is spread over a large portion of surface, it becomes proportionably diminished in force; and therefore the objects, though magnified, appear proportionably dim. Thus, though any magnifying glass should enlarge the diameter of the object 10 times, and consequently magnify the surface 100 times, yet if the focal distance of the glass was about eight inches (provided this was possible), and its diameter only about the size of the pupil of the eye, the object would appear 100 times more dim when we looked through the glass, than when we beheld it with our naked eyes; and this even on a supposition that the glass transmitted all the light which fell upon it, which no glass can do. But if the focal distance of the glass was only four inches, though its diameter remained as before, the inconvenience would be vastly diminished, because the glass could then be placed twice as near the object as before, and consequently would receive four times as many rays as in the former case, and therefore we should see it much brighter than before. Going on thus, still diminishing the focal distance of the glass, and keeping its diameter as large as possible, we shall perceive the object more and more magnified, and at the same time very distinct and bright. It is evident, however, that, with regard to optical instruments of the microscopic kind, we must sooner or later arrive at a limit which cannot be passed. This limit is formed by the following particulars. 1. The quantity of light lost in passing through the glass. 2. The diminution of the glass itself, by which it receives only a small quantity of rays. 3. The extreme shortness of the focal distance of great magnifiers, whereby the free access of the light to the object which we wish to view is impeded, and consequently the reflection of the light from it is weakened. 4. The aberrations of the rays, occasioned by their different refrangibility.

To understand this more fully, as well as to see how far these obstacles can be removed, let us suppose the lens made of such a dull kind of glass that it transmits only one half of the light which falls upon it. It is evident that such a glass, of four inches focal distance, and which magnifies the diameter of an object twice, still supposing its own breadth equal to that of the pupil of the eye, will shew it four times magnified in surface, but only half as bright as if it was seen by the naked eye at the usual distance; for the light which falls upon the eye from the object at eight inches distance, and likewise the surface of the object in its natural size, being both represented by 1, the surface of the magnified object will be 4, and the light which makes that magnified object visible only 2; because, though the glass receives four times as much light as the naked eye does at the usual distance of distinct vision, yet one half is lost in passing through the glass. The inconvenience in this respect can therefore be removed only as far as it is possible to increase the clearness of the glass, so that it shall transmit nearly all the rays which fall upon it; and how far this can be done, hath not yet been ascertained.

The second obstacle to the perfection of microscopic glasses is the small size of great magnifiers, by which, notwithstanding their near approach to the object, they receive a smaller quantity of rays than might be expected. Thus, suppose a glass of only $\frac{1}{10}$th of an inch focal distance; such a glass would increase the visible diameter 80 times, and the surface 6400 times. If the breadth of the glass could at the same time be preserved as great as that of the pupil of the eye, which we shall suppose $\frac{2}{10}$ths of an inch, the object would appear magnified 6400 times, at the same time that every part of it would be as bright as it appears to the naked eye. But if we suppose that this magnifying glass is only $\frac{1}{20}$th of an inch in diameter, it will then receive only $\frac{1}{4}$th of the light which otherwise would have fallen upon it; and therefore, instead of communicating to the magnified object a quantity of illumination equal to 6400, it would communicate only one equal to 1600, and the magnified object would appear four times as dim as it does to the naked eye. This inconvenience, however, is still capable of being removed, not indeed by increasing the diameter of the lens, because this must be in proportion to its focal distance, but by throwing a greater quantity of light on the object. Thus, in the above-mentioned example, if four times the quantity of light which naturally falls upon it could be thrown upon the object, it is plain that the reflection from it would be four times as great as in the natural way; and consequently the magnified image, at the same time that it was as many times magnified as before, would be as bright as when seen by the naked eye. In transparent objects this can be done very effectually by a concave speculum, as in the reflecting microscope already described: but in opaque objects the case is somewhat more doubtful; neither do the contrivances for viewing these objects seem entirely to make up for the deficiencies of the light from the smallness of the lens and shortness of the focus.—When a microscopic lens magnifies the diameter of an object 40 times, it hath then the utmost possible magnifying power, without diminishing the natural brightness of the object.

The third obstacle arises from the shortness of the focal distance in large magnifiers: but in transparent objects, where a sufficient quantity of light is thrown on the object from below, the inconvenience arises at last from straining the eye, which must be placed nearer the glass than it can well bear; and this entirely supersedes the use of magnifiers beyond a certain degree.

The fourth obstacle arises from the different refrangibility of the rays of light, and which frequently causes such a deviation from truth in the appearances of things, that many people have imagined themselves to have made surprising discoveries, and have even published them to the world; when in fact they have been only as many optical deceptions, owing to the unequal refractions of the rays. For this there seems to be no remedy, except the introduction of achromatic glasses into microscopes as well as telescopes. How far this is practicable, hath not yet been tried; but when these glasses shall be introduced (if such introduction is practicable), microscopes will then undoubtedly have received their ultimate degree of perfection.

With regard to telescopes, those of the refracting kind have evidently the advantage of all others, where the aperture is equal, and the aberrations of the rays are corrected according to Mr. Dollond's method; because the image is not only more perfect, but a much greater quantity of light is transmitted than what can be reflected from the best materials hitherto known. Unluckily, however, the imperfections of the glass set a limit to these telescopes, as hath already been observed, so that they cannot be made above three feet and an half long. On the whole, therefore, the reflecting telescopes are preferable in this respect, that they may be made of dimensions greatly superior; by which means they can both magnify to a greater degree, and at the same time throw much more light into the eye.

With regard to the powers of telescopes, however, they are all of them exceedingly less than what we should be apt to imagine from the number of times which they magnify the object. Thus, when we hear of a telescope which magnifies 200 times, we are apt to imagine, that, on looking at any distant object through it, we should perceive it as distinctly as we would with our naked eye at the 200th part of the distance. But this is by no means the case; neither is there any theory capable of directing us in this matter: we must therefore depend entirely on experience.

The best method of trying the goodness of any telescope is by observing how much farther off you are able to read with it than you can with the naked eye. But that all deception may be avoided, it is proper to choose something to be read where the imagination cannot give any assistance, such as a table of logarithms, or something which consists entirely of figures; and hence the truly useful power of the telescope is easily known. In this way Mr. Short's large telescope, which magnifies the diameter of objects 1200 times, is yet unable to afford sufficient light for reading at more than 200 times the distance at which we can read with our naked eye.

With regard to the form of reflecting telescopes, it is now pretty generally agreed, that when the Gregorian ones are well constructed, they have the advantage of those of the Newtonian form. One advantage evident at first sight is, that with the Gregorian telescope an object is perceived by looking directly through it, and consequently is found with much greater ease than in the Newtonian telescope, where we must look into the side. The unavoidable imperfection of the specula common to both also gives the Gregorian an advantage over the Newtonian form. Notwithstanding the utmost care and labour of the workmen, it is found impossible to give the metals either a perfectly spherical or a perfectly parabolical form. Hence arises some indistinctness of the image formed by the great speculum, which is frequently corrected by the little one, provided they are properly matched. But if this is not done, the error will be made much worse; and hence many of the Gregorian telescopes are far inferior to the Newtonian ones; namely, when the specula have not been properly adapted to each other. There is no method by which the workman can know the specula which will fit one another without a trial; and therefore there is a necessity for having many specula ready made of each sort, that in fitting up a telescope those may be chosen which best suit each other.

The brightness of any object seen through a telescope, in comparison with its brightness when seen by the naked eye, may, in all cases, be easily found by the following formula. Let *n* represent the natural distance of a visible object, at which it can be distinctly seen; and let *d* represent its distance from the object-glass of the instrument. Let *m* be the magnifying power of the instrument; that is, let the visual angle subtended at the eye by the object when at the distance *n*, and viewed without the instrument, be to the visual angle produced by the instrument as 1 to *m*. Let *a* be the diameter of the object-glass, and *p* be that of the pupil. Let the instrument be so constructed, that no parts of the pencils are intercepted for want of sufficient apertures of the intermediate glasses. Lastly, let the light lost in reflection or refraction be neglected.

The brightness of vision through the instrument will be expressed by the fraction $\left(\frac{an^2}{mpd}\right)$, the brightness of natural vision being 1. But although this fraction may exceed unity, the vision through the instrument will not be brighter than natural vision. For, when this is the case, the pupil does not receive all the light transmitted through the instrument.

In microscopes, *n* is the nearest limits of distinct vision, nearly eight inches. But a difference in this circumstance, arising from a difference in the eye, makes no change in the formula, because *m* changes in the same proportion with *n*.

In telescopes, *n* and *d* may be accounted equal, and the formula becomes $\frac{a^2}{mp^2}$.

TELESCO′PICAL. *a.* (from *telescope.*) Belonging to a telescope; seeing at a distance.

Telescopical stars, are such as are not visible to the naked eye, being only discernible by means of a telescope. See Star.

All stars less than those of the 6th magnitude are telescopic to an ordinary eye.

To **TELL.** *v. a.* pret. and part. pass. *told.* (ꞇellan, Saxon; *taelen, tellen,* Dutch; *talen,* Danish.) 1. To utter; to express; to speak (*Milton*). 2. To relate; to rehearse (*Pope*). 3. To teach; to inform (*Sanderson*). 4. To discover; to betray (*Numbers*). 5. To count; to number (*Prior*). 6. To make excuses. A low word (*Shakspeare*).

To **Tell.** *v. n.* 1. To give an account; to make report (*Psalms*). 2. To Tell *on.* To inform of (*Samuel*).

Tell (William), an illustrious Swiss patriot, chief instrument of the revolution which delivered the Swiss cantons from the German yoke in 1307. Grisler, the governor of these provinces for the emperor Albert, having ordered him, under pain of death, to shoot at an apple placed on the head of one of his children; he had the dexterity, though the distance was very considerable, to strike it off without hitting the child. The tyrant, perceiving he had another arrow concealed under his cloak, asked him for what purpose? To which he boldly replied, "To have shot you through the heart, if I had had the misfortune to kill my son." The enraged governor now ordered him to be hanged; but his fellow-citizens, animated by his fortitude and patriotism, flew to arms; attacked and vanquished Grisler, who was shot to death by Tell; and the association for the independency took place that instant.

Tell-tale, a name sometimes given to the Perpetual-log. See that article.

Tell-tale. *s.* One who carries officious intelligence; one who gives malicious information.

TELLA CELLULOSA. See Cellular membrane.

TE′LLER. *s.* (from *tell.*) 1. One who tells or relates. 2. One who numbers; a numberer. 3. A *teller* is an officer of the exchequer, of which there are four; their business is to receive all monies due to the king, and give the clerk of the pell a bill to charge him therewith; they also pay any money payable by the king, by warrant from the auditor of the receipt (*Cowell*).

TELLICHERRY, a seaport of Hindoostan, on the coast of Malabar, where there is an English factory. It is 30 miles N.N.W. of Calicut. Lon. 75. 50 E. Lat. 11. 48 N.

TELLIRA, in zoology, a genus of the class vermes, order testacea. Animal a tethys: shell bivalve, generally sloping on one side; in the fore-part of one valve a convex, in the other a concave fold; hinge with usually three teeth, the lateral ones smooth in one shell. Ninety-four species—scattered through the seas of the globe; chiefly found in the Indian ocean; nineteen or twenty common to our own coasts. They are thus subdivided.

A. Ovate and thickish.
B. Ovate, compressed.
C. Suborbicular.

Some of these resemble a solen, others a venus. T. reticulata resembles the leaves of the duck-weed. They are of very different sizes, from that of a pea to the breadth of four inches. T. remies, one of the largest, with shell suborbicular, compressed, and transversely wrinkled, is about three inches long and three and a half broad. It inhabits the Indian and American oceans: the American specimens have a yellowish mixture, and the wrinkles are slight.

TELLURIUM, in mineralogy, a genus of the class metals. Blueish-white, soft, very brittle, and easily reducible to powder, of a lamellar texture; specific gravity 6.115; melting in a heat somewhat above the fusing point of lead, and, if the heat be a little increased, boiling and evaporating, attaching itself in brilliant drops to the upper part of the retort; before the blow-pipe burning with a lively blue flame, the edges of which are green, and at last evaporating in a white smoke smelling like radishes; partly soluble in concentrated sulphuric acid, and giving the solution a crimson colour, which precipitates a white powder on the addition of a large quantity of water. Four species. The following are the chief:

1. T. nativum. Native tellurium. Sylvanite. Soft, heavy, somewhat ductile, with metallic lustre. Found in the mine of Mariaklif in the Facebay mountains of Transylvania, massive and disseminated: contains tellurium 92.55, iron 7.20, gold 0.25. (*Klaproth*).

2. T. graphicum. Graffic tellurium. Tin-white, or inclining to yellow, soft, brittle, staining a little, in small prismatic crystals, often grouped in such a manner as to resemble written characters. Found in the Franciscus mine at Offenbanga in Transylvania, with metallic lustre: contains tellurium 60, gold 30, silver 10. (*Klaproth*).

3. T. album. White tellurium. Sylvanite. Silver-white, passing into brass-yellow, soft, heavy, somewhat ductile, with metallic lustre. Found in the Nagyag mine of Transylvania, disseminated or crystallized in small four-sided prisms: fracture in one direction foliated, in the other uneven: contains, according to Klaproth,

Tellurium	44.75
Gold	26.75
Lead	19.50
Silver	8.50
Sulphur	50
	100

Reguline tellurium may be obtained by heating the white oxyd of this metal in contact with carbonaceous matter; but as tellurium is both easily volatilizable and readily inflammable, certain precautions are necessary to ensure the success of the experiment. If the reduction be attempted in a crucible, in proportion as the metal is de-oxydated, it rises in vapours through the luting, and burns with a blue flame; so that by the time the oxyd is reduced the metal will have escaped. In order to succeed perfectly the following method must be pursued: the oxyd, being previously well mixed with eight or nine per cent. of charcoal powder, is to be put into a small glass retort, with a receiver adapted, and heated gradually to a low state of ignition. As soon as it arrives at this point a sudden and considerable production of carbonic acid takes place, a little of the mixture passes into the receiver, and metallic globules will be observed adhering to the neck of the retort, as in the distillation of mercury. The apparatus being then cooled slowly, the tellurium will be found at the bottom of the vessel, with a clear, bright, crystalline surface, perfectly reduced and unmixed with charcoal. A hundred parts of white oxyd afford about eighty-three of metal.

Tellurium combines readily by fusion with its own weight of sulphur; and the result is a lead-coloured striated mass, with a metallic lustre. By ignition in a retort, a part of the sulphur sublimes, carrying with it a small proportion of metal, by which it acquires a blackish-brown colour. Nitric acid dissolves tellurium, and the result is a clear colourless solution, capable of affording by concentration and cooling slender needle-shaped crystals. Nitrat of tellurium is not decomposable by water. Muriatic acid, by itself, has little or no action on tellurium, but when assisted by a small proportion of nitric acid the solution goes on rapidly. This solution is clear and colourless, precipitating a white muriated oxyd or submuriat on the addition of water; which, however, in a larger proportion of this fluid is again soluble. If, on the other hand, the concentrated muriat be diluted with alkohol instead of with water, no tellurium remains in solution. Concentrated sulphuric acid, by digestion without heat, takes up a small portion of tellurium, and acquires thereby a deep amethystine red colour. On the addition of a little water a black flocculent precipitate takes place, and the solution loses its colour. The colour of the solution is likewise destroyed by mere heat, a white oxyd being precipitated.

If, however, the sulphuric acid be previously diluted with water and mixed with a few drops of nitric acid, a considerable proportion of tellurium is taken up, and the solution is without colour, and not decomposable by the addition of water. The acid solutions of tellurium are all decomposed by the alkalies; but if these last be added in excess the oxyd is again taken up, whether a pure or carbonated alkali be made use of.

Prussiat of potash, if pure, does not decompose the salts of tellurium. Tincture of galls produces a flocculent, pale, yellowish-brown precipitate. The white oxyd of tellurium, if heated by the blow-pipe or charcoal, is reduced with a rapid effervescence to the metallic state, and is immediately after volatilized by combustion, and reconverted to an oxyd. If, on the other hand, it be treated without any inflammable matter in a retort, it fuses into a pale yellow striated mass.

Tellurium is not made use of either in the metallic or in any other state.

TELTSH, a town of Germany, in Moravia, seated on the frontiers of Bohemia, at the source of the river Teya, 36 miles W.N.W. of Znaim. Lon. 16. 0 E. Lat. 49. 0 N.

TEMERA'RIOUS. *a.* (*temeraire*, French; *temerarius*, Latin.) 1. Rash; heady (*L'Estrange*). 2. Careless; heedless (*Ray*).

TEME'RITY. *s.* (*temeritas*, Latin.) Rashness; unreasonable contempt of danger.

TEMESWAR, a town of Upper Hungary, capital of a territory called the bannat of Temeswar. It formerly passed for impregnable; but it was taken by prince Eugene, in a dry season, in 1716. It is seated in a morass, 60 miles N.E. of Belgrade, and 150 S.E. of Buda. Lon. 22. 20 E. Lat. 45. 37 N.

TEMISSA, a large town of the kingdom of

Fezzan. Here the caravan of pilgrims from Bornou and Nigritia, which takes its departure from Mourzook, and travels by way of Cairo to Mecca, usually provides the stores of corn and dates, and dried meat, requisite for its dreary passage. Temissa is 120 miles E.N.E. of Mourzook.

TEMPE, a valley in Thessaly, between mount Olympus at the north, and Ossa at the south, through which the river Peneus flows into the Ægean. The poets have described it as the most delightful spot on the earth, with continually cool shades, and verdant walks, which the warbling of birds rendered more pleasant and romantic. Tempe extended about five miles in length, but was scarce one acre and a half wide. All valleys that are pleasant, either for their situation or the mildness of their climate, are called Tempe by the poets.

To TE'MPER. *v. a.* (*tempero*, Latin.) 1. To mix so as that one part qualifies the other (*Milton*). 2. To compound; to form by mixture; to qualify as an ingredient (*Shakspeare*). 3. To mingle (*Addison*). 4. To beat together to a proper consistence (*Wisdom*). 5. To accommodate; to modify (*Wisdom*). 6. To bring to due proportion; to moderate excess (*Milton*). 7. To soften; to mollify; to assuage; to sooth; to calm (*Otway*). 8. To form metals to a proper degree of hardness (*Boyle*). 9. To govern. A latinism (*Spenser*).

TE'MPER. *s.* (from the verb.) 1. Due mixture of contrary qualities (*Arbuthnot*). 2. Middle course; mean or medium (*Swift*). 3. Constitution of body (*Burnet*). 4. Disposition of mind (*Locke*). 5. Constitutional frame of mind (*Shakspeare*). 6. Calmness of mind; moderation (*Pope*). 7. State to which metals are reduced, particularly as to hardness (*Sharpe*).

TEMPERAMENT, in medicine and physiology, a name given to certain physical and moral differences that present themselves in man, and which are supposed to depend on the different proportions and connexions between the parts of the animal frame and the different degrees of energy possessed by its different organs. Independently of which every individual is said to possess a different modification of being, by which his own temperament is distinguished from that of every other person's, although in most points it will be found to bear a very close resemblance. These personal variations, which the Latins denominated temperaments, were by the Greeks called idiosyncrasies.

The predominance of one peculiar system of organs will often be found to modify the whole economy, to impress obvious differences on the results of the organization, and to hold no less influence over the moral and intellectual than over the physical faculties. Thus, if the heart and arteries, from whence the blood circulates through every part, possess a predominant activity, the pulse will be strong, frequent, and regular; the complexion florid; the physiognomy animated; the stature elevated; the figure agreeable, though strongly marked; the fleshy parts fine; the deposition of fat in the cellular tissue freely secreted; the hair of a flaxen, or inclined to a chesnut colour; the nervous susceptibility acute, and rapidly operated upon by impressions from external objects; the ideas quick; the perception prompt; the memory tenacious; the imagination lively and luxuriant; the individual will be often addicted to the pleasures of the table, of convivial society, of love; and possess a state of health seldom interrupted by slight diseases. And all his maladies, modified by this peculiar temperament, will have their principal seat in the circulating system, and produce inflammatory fever, local inflammations, hæmorrhagies, &c. which, when in a moderate degree, will often terminate by the power of nature, or yield to antiphlogistic remedies, of which bleeding is the chief. The ancients denominated this disposition of the body the sanguineous temperament; they conceived it to be produced by a combination of heat and moisture, and well knew that in both sexes it chiefly exists during youth, as also that it is augmented in the spring, or that season of the year which has been so correctly compared to the stage of youth.

In order that the specific characters of the sanguineous temperament should present themselves to the greatest advantage, it is requisite that an eutonous lymphatic system should harmonize with the energy of the sanguineous, so that both orders of vascular organs may be in a just equilibrium. The physical traits of this temperament are exhibited in the beautiful statues of Antinous and the Belvidere Apollo; its moral character is drawn by Plutarch in the lives of Alcibiades and Marc Antony.

If men of this temperament accidentally devote themselves to works that require great exertion of the motive organs, the muscles, moistened with fluids, and disposed to a degree of vigour equal to that of the sanguiferous system, increase in size; the sanguineous temperament becomes modified by this peculiarity of the muscular fibres, and a muscular or athletic temperament will be the result, evincing all the external characters of force and vigour. The head is, in this case, small; the neck very strong, particularly behind; the shoulders broad; the chest large; the hips solid; the intermuscular spaces strongly marked; the hands, feet, knees, and all the articulations not abounding in muscles, comparatively very small; the direction of the tendons visible under the superincumbent skin. The susceptibility is not considerable, nor the perception acute; but though difficult to be set into action, the athletic, when once roused from his habitual tranquillity, surmounts every resistance. The Farnesian Hercules presents us with a model of the physical attributes of this particular constitution of the body. It would be difficult to find in history a man having united to these corporeal powers a degree of intellectual faculties sufficient to acquire an immortality of fame. To become distinguished in the career of the sciences and the fine arts it is necessary to possess an exquisite sensibility; a condition directly hostile to the full perfection of muscular masses.

If the sensibility be both acute and easily excitable, and if, in addition to these gifts, there should exist a capability of dwelling for a long time on the same object; if the pulse be strong, hard, and frequent; the veins cutaneous, projecting; the skin rather brown, inclining to yellow; the hair black; the body moderately fleshy; the muscles firm and well-marked; and the figure expressive: if these conditions exist, the passions will be found violent, the motions of the mind frequently abrupt and impetuous, and the character steady and inflexible; hardy in the conception of a project, constant and indefatigable in its execution. It is among men of this temperament that we are to look for those who, at different periods, have seized the government of the world; abounding in courage, audacity, and activity, they have all signalized themselves by great virtues, or by great crimes: they have been the terror or the admiration of the universe. Such were Alexander, Julius Cæsar, Brutus, Mahomet, and Charlemagne: and such in later times have been Peter the Great, Charles XII. of Sweden, Frederick of Prussia, and Napoleon Buonaparte.

This temperament is also characterised by the premature appearance of the moral faculties. The men just enumerated, when bursting from adolescence, conceived and executed enterprises that would have been worthy of their riper judgment. As full perfection and activity of the liver, an obvious superabundance of the biliary juices, most frequently co-exist with this constitution of the body, in which the vascular system possesses a predominant energy apparently at the expence of the cellular and lymphatic system, the ancients denominated this modification of the animal frame the bilious temperament. The diseases to which individuals of this class are subject sometimes present a derangement of the action of the hepatic organs, united with a change in the biliary fluid, as their principal character, and at other times as a collateral circumstance: and among the medicines employed to remedy these kinds of affections, evacuants, and particularly emetics, deserve to be most esteemed.

If all the characters attributed to the bilious temperament be carried to the highest degree of intensity, and to this condition be added keen susceptibility, the man is habitually irascible, and launches into a passion upon trivial occasions. It is thus Homer has described Achilles and several others of his heroes.

When to this bilious temperament is superadded a morbid obstruction of some organ in the abdomen, or any derangement in the functions of the nervous system, and the vital or involuntary organs are weak and irregular in their action; the skin will become deeply tinged; the countenance uneasy and dismal; the bowels inactive; all the excretions tardy; the pulse hard, and habitually contracted. This general uneasiness throws an influence over the whole cast of ideas; the imagination becomes gloomy, the character suspicious. The numerous varieties offered by this temperament were denominated by the ancients melancholic; the diversity of circumstances that may produce it, as hereditary disease, long-continued sorrow, incessant study, the abuse of pleasure, &c. should induce us to adopt the opinion promulgated by Le Clerc in his Natural History of Man in a State of Disease, that the melancholic temperament is less a natural and primitive constitution than a morbid affection either hereditary or acquired. The characters of Tiberius and of Louis XI. leave nothing more to be elucidated in the moral view of this temperament. but no person perhaps presents us with it in a greater degree of energy than the illustrious philosopher of Geneva. See Rousseau's Reveries du Promenear Solitaire; and the two last parts of his Confessions.

If the proportion of the fluids be too considerable for that of the solids, this superabundance, which is always in favour of the lymphatic system, gives the whole body an increased bulk from impletion of the cellular texture. The fleshy parts are soft; the skin fair; the hair flaxen or sandy; the pulse weak or low; the figure plump, but without expression; all the vital actions more or less languid; the memory irretentive; the attention wavering.—Those who possess this temperament, to which the ancients gave the name of pituitary or phlegmatic, but which by ourselves is called lymphatic, as depending on the excess and activity of this system, have generally an insurmountable desire of indolence, an utter aversion to exercise whether of body or mind; and hence we shall in vain expect to find any of this character among the illustrious men in Plutarch. Little adapted for the transaction of public affairs, they have never disturbed the face of the earth by their negociations, their intrigues, or their conquests. One of Cicero's friends, Pomponius Atticus, whose history has been transmitted to posterity by Cornelius Nepos, furnishes us with the model of a man who maintained a good understanding with all the parties that raged in the Roman republic during the civil wars of Pompey and Octavius. Among the moderns, the indifferent Michael Montaigne, all whose passions were so moderate that he reasoned on every thing, even a sentiment, and who was equally inaccessible to love and to hatred, was completely phlegmatic or pituitous. But in him the predominance of the lymphatic system was not carried to such a degree of ascendancy as to prevent the exercise of great nervous susceptibility.

This property, which makes us more or less alive to impressions received by our external organs, is weak in the pituitary system, nearly non-existent in the athletic, moderate in the sanguine, and acute in the bilious temperament, When this property of susceptibility is excessive it constitutes the nervous temperament, which is seldom natural or primitive, but most frequently acquired, and usually dependent on a sedentary life, reiterated pleasures, exaltation of ideas maintained by reading works of the imagination, as novels or romances. The nervous temperament is distinguished by a slender make, smallness of muscles, which, at the same time, are relaxed and wasted by the vivacity of the sensations, the promptitude and variability of the determinations and of the judgment. Hysterical women whose wishes are absolute but changeable, their sensibility very great, frequently present this state of body in all its characters. Sometimes, however, such persons are moderately fleshy, from some degree of the plenitude of the lymphatic tendency being combined with high predominance of the nervous. In such persons convulsive motions are by no means uncommon; and if it be considered, on the other hand, that the athletic constitution is the direct opposite of the nervous, and gives a predisposition to tetanus, may it not be said that we occasionally find both extremes united, and concurring in similar effect? Antispasmodic medicines succeed in the treatment of diseases of this system, which always more or less evince the marks of the temperament. Stimulants, on the contrary, are more advantageous in those affections to which persons of a pituitary or lymphatic temperament are habitually prone.

For the most part we are born with these peculiar dispositions of the body; though the native tendency becomes very generally, by education, manner of living, climate or acquired habits, altered or totally changed. It is, besides, a very rare thing to meet with individuals, who present us with every one of the features assigned to the different temperaments in all their purity. The descriptions here offered are selected from a numerous collection of individuals who bear striking resemblances to each other; their characters are mere abstractions, and difficult to be realized, because all men are of mixed temperaments, and are both sanguine and bilious, sanguine and lymphatic, &c. We have remarked, however, that the sanguine constitution is the direct reverse of the melancholic, and never combines with it; the same contrast exists between the bilious and lymphatic: although it may happen that a person of a sanguineous habit may become melancholic after a lapse of years; for man never remains in one state of nature, being acted upon by every surrounding body. His physical qualities, if observed at distant periods of life, present as many differences as his moral character.

Climate, again, exerts an obvious influence over the temperament. Thus the bilious is that of the greatest number of the inhabitants of the southern regions; the sanguine that of the northern nations; while the lymphatic is more prevalent in cold and damp countries, as Holland, &c. Among the moderns who have modified and enriched the ancient doctrine of temperaments are Richerand, from whom these observations are chiefly drawn, La Bouyere, Hallé, Cabanis, and Pinel.

TEMPERAMENT, in music, the accommodation or adjustment of the imperfect sounds by transferring a part of their defects to the more perfect ones, in order to remedy, in some degree, the false intervals of those instruments, the sounds of which are fixed; as the organ, harpsichord, piano-forte, &c.

Temperament is what the Italians call participatione, participato, or systema temperato, because it is founded on temperature; that is, on the diminution of some intervals and augmentation of others, by which it partakes of the diatonic and chromatic systems.

It results from the principle on which our gamut has been formed, that the acuter sound of each of the three perfect concords, whereof it is composed, makes a perfect fifth with the fundamental sound of that concord. But if two sounds be compared taken in different concords, such as the *re* and the *la* forming likewise a fifth, there will then be found a small alteration in the accuracy of that interval. For the ratio of these two sounds is that of $\frac{9}{8}$ to $\frac{15}{9}$, or of 27 to 40, a little greater than that of 2 to 3 which corresponds to a perfect fifth. In order that the *la* might be with the *re* in the relation of that fifth, it would be necessary that its expression should become $\frac{27}{16}$. Let us for a moment suppose this to be its expression, and let us take above this same *la* a new sound *mi*, making also a perfect quint with it; we shall have the expression for that *mi*, by multiplying $\frac{11}{16}$ by $\frac{3}{2}$, the ratio of the quint; whence we have $\frac{81}{32}$. Now, if there had been no alteration in the intervals, this *mi* would be a perfect acuter octave to that of the gamut. Yet this is not the case: for if we raise this latter *mi* an octave, its expression, which was $\frac{5}{4}$, will become $\frac{10}{4}$, or $\frac{30}{32}$, less than $\frac{81}{32}$ in the ratio of 80 to 81. Hence it follows that the *mi* expressed by $\frac{81}{32}$ cannot but be more than the third of the *ut* whose expression is 2; the ratio between that *ut* and the *mi* in question, reduced to its greatest simplicity, is that of 64 to 81, a little greater than that of 1 to $\frac{5}{4}$, or of 64 to 80, which belongs to the *ut* and the *mi* of the gamut.

Without entering more into detail in this place, it may suffice for us to remark, generally, that of these three intervals, the octave, the fifth, and the third, we cannot preserve any one in all its purity, without altering the two others; and hence has arisen a difficulty which has been long acknowledged, relatively to the manner of tuning stringed instruments (such as harpsichords) where each touch corresponds to a sound whose degree is determined by the operation itself. In consequence of this, various methods have been contrived to furnish a system of temperament, that is to say, to combine the alterations in such manner that the harmony should not suffer perceptibly: and all these methods concur in this point, that it is indispensable to retain the accuracy of the octaves by sacrificing some little of that of the fifths and the thirds; since it is nearly with regard to the octave as the unison, which, on account of its great simplicity, is so agreeable to the ear, that the least defect in its precision cannot be tolerated: the ear, however, rather relaxes its severity with respect to less simple intervals; in this case gratuitously supplying their deficiencies, by supposing those differences not to exist which it cannot appreciate.

Rameau, after having hesitated long as to the choice of the best temperament, finished by adopting that in which all the fifths are found equally altered, seeing that no reason could be adduced why one should be modified rather than the other. It has been remarked, however, that in this system the thirds would become harsh and offensive; the method has therefore been generally adopted, to which Rameau himself, at first, gave the preference, though he afterwards abandoned it. In the instruments tuned by that method, the fifths given by the natural tones of the gamut retain their harmony almost entirely; the most perceptible differences resting upon the intermediate semitones: the musicians have taken in the series of fifths, certain notes by which they verify their operation from time to time, judging by the accuracy of some other concord, such as that of the third, which each of those notes ought to make with one of the notes previously tuned. Hence there results a great diversity in the alterations undergone by the intervals of the fifth and the third which constitute the series of the different sounds; and this diversity has even been regarded as an advantage: for, according as one or other sound has been chosen in preference for a fundamental, that is to say, for that to which all the others are referred, in such manner that the modulation rests, so to speak, upon that note as on a base, the fifths and the thirds which pervade the song have something of a dull cast, calculated to excite pensiveness and melancholy, or we know not what of refinement and sprightliness which inspires joy. Thus the modulation borrows from the peculiar manner in which the intervals it employs have been altered, a characteristic tint which it supports of itself; and that which many have been tempted to regard as a defect, becomes, in the hands of the musician, a means of adding to the expression of the sentiment he wishes to depict.

The subject of musical temperament is too comprehensive and important to be sufficiently discussed here: yet it is a topic which is worthy the closest attention of all who study the philosophy of musical sounds. We therefore beg to refer the reader to Dr. Smith's valuable work on Harmonics, and to the excellent article Temperament, in the Sup. Ency. Britan. for more useful information on this point than in any other English works we are acquainted with. An abridgment of some of Smith's propositions is given in the late bishop of Clonfert's Syllabus of his Lectures.

For our own parts, we must quit the subject, however interesting, after specifying two or three of the best systems.

The objects proposed to be attained by temperament are two-fold: first, that we may transpose music from one pitch or key to another (upon an instrument of fixed tones), and still have all the musical intervals as near perfection as possible: secondly, to obtain, in the compass of three or four octaves, as many correct concords of full harmony as possible; i. e. consisting of a fundamental with its major third and its fifth, direct or inverted. The maxims for attaining these objects have been very gratuitous, and many of them very inefficient. Systems of temperament have been proposed by Huygens, Ptolemy, Smith, Young, &c. The best in our estimation are, the isotonic or equal temperament, in which the lengths of wires to produce the different semitones in an octave are so many successive geometrical proportionals between 1 and $\frac{1}{2}$; and that of Dr. Smith, which he calls equal harmony, where each concord, except the octave, is tempered in the inverse proportion of the product of the terms of its perfect ratio, and is very nearly equivalent to a division of the octave into 50 equal parts. We admit that the Stanhope temperament is very ingenious; but it is certainly inferior to either of these; at least his "bi-equal thirds" and "tri-equal quints" are very offensive to our ears. Lord Stanhope says his "mode of tuning does not produce one single offensive quint;" but surely this cannot be correct: for if he tunes perfectly seven of the quints, the other five must, of necessity, be more imperfect, that is, more offensive, than those in the equal or isotonic temperament, which, in his lordship's opinion, are all imperfect.

Next to these we prefer the temperament proposed by Dr. Young in the Philosophical Transactions for 1800. It is contained in the following table.

1.	2.	3.	4.	5.		
				IIIds upward on		
C	100000	5.00000		C	135	
C✱	94723	4.97645	2355	G. F.	190	
D	89304	4.95087	4913	D. B♭	245	
E♭	83810	4.92330	7670	A. E♭	346	Sharp.
E	79752	4 90174	9826	E. A♭	448	
F	74921	4.87461	12539	B. C✱	494	
F✱	71041	4.85151	14849	F✱	540	
G	66822	4.82492	17508	3ds upward on		
G✱	63148	4.80036	19964	A. E.	236	
A	59676	4.77580	22420	D. B.	291	
B♭	56131	4.74921	25079	G. F✱	346	Flat.
B	53224	4.72610	27390	C. C✱	448	
C	50000	4.69897	30103	F. G✱	494	
				B♭. E♭	540	

Vths upward on

E♭. G✱. C✱. F✱	perfect	
F. B♭. E. B	46	Flat.
C. G. D. A	116	

Interval of a comma - - 540
minor third - 7918
major third - 9691
fifth - - 17609

The first column of the above table contains the ordinary designations of the notes. The second contains the corresponding lengths of the monochord. The third contains the logarithms of column second. The fourth contains the difference of each logarithm from the first. The next column contains, first, the temperaments of all the major thirds, having for their lowest note the sound corresponding to the letter. Thus 494, or $\frac{494}{540}$ of a comma, is the temperament of the IIId, B — D✱, and C✱ — F. Secondly, it contains all the minor thirds formed on the notes represented by the letters. The column below contains the temperaments of the Vths.—N. B. These temperaments are calculated by the author. We have found some of them a little different. Thus we make the temperament of C — G only 108. Below this we have set down the measures of the perfect intervals, which are to be compared with the differences of the logarithms in column third.

A temperament, however, which very nearly coincides with Dr. Young's, has great reputation on the continent. This is the temperament by Mr. Kirnbergher, published at Berlin in 1771, in his book called Die Kunst des reinen Satzes in der Musik. The eminent mathematician major Templehoff has made some important observations on this temperament, and on the subject in general, in an essay published in 1775, Berlin. Dr. Young's is certainly preferable.

The monochord is thus divided by Kirnbergher:

C	=1,0000	F	= 7500	B♭	=5625
C✱	9492	F✱	7111	B	5313
D	8889	G	6667	*c*	5000
E♭	8437	G✱	6328		
E	8000	A	5963		

Besides the works already referred to, the reader may consult Young's Natural Philosophy, vol. ii.; Gregory's translation of Haüy's Philosophy, vol. i.; and Mr. Farey's papers on this subject, in Tilloch's Philosophical Magazine.

TEMPERAME'NTAL. *a.* (from *temperament.*) Constitutional (*Brown*).

TE'MPERANCE. *s.* (*temperantia*, Latin.) 1. Moderation: opposed to *gluttony* and *drunkenness* (*Temple*). 2. Patience; calmness; sedateness; moderation of passion (*Spenser*).

TE'MPERATE. *a.* (*temperatus*, Lat.) 1. Not excessive; moderate in degree of any quality (*Bacon*). 2. Moderate in meat and drink (*Wiseman*). 3. Free from ardent passion (*Shakspeare*).

TE'MPERATELY. *ad.* (from *temperate.*) 1. Moderately; not excessively (*Addison*). 2. Calmly; without violence of passion (*Shakspeare*). 3. Without gluttony or luxury (*Taylor*).

TE'MPERATENESS. *s.* (from *temperate.*) 1. Freedom from excesses; mediocrity. 2. Calmness; coolness of mind (*Daniel*).

TE'MPERATURE. *s.* (*temperatura*, Lat.) 1. Constitution of nature; degree of any qualities (*Watts*). 2. Mediocrity; due balance of contrarieties (*Davies*). 3. Moderation; freedom from predominant passion (*Spenser*).

TEMPERATURE (Animal). One of the most extraordinary phænomena in animal physiology is the power possessed by the living system to preserve its natural temperature, whatever be the temperature of the atmosphere around it; and consequently in higher temperatures to depress, and in lower to raise the thermometer. This subject has lately been examined into with much ingenuity by M. Delarouche, who has remarked that the degree of cold generated upon exposure to high temperatures is not quite equal to that of heat generated upon exposure to similar differences of cold temperatures. In investigating the cause of these singular facts he conceives it to be of a twofold nature, partly physical and partly vital. His paper upon the subject was read to the French Institute with approbation; and we copy the following extract from its appearance in the Journal de Physique, vol. lxxi.

"It is nearly half a century," says he, "since this remarkable faculty was noticed in animals; and it has subsequently given rise to various experiments, particularly those made conjointly by sir J. Banks, sir C. Blagden, Dr. Fordyce, and some other philosophers: but we have not yet any precise ideas of its cause, which some suppose to be the refrigeration produced by the evaporation of the perspirable matter, others the same with that of animal heat, whether they imagine themselves acquainted with this, or believe it to be yet unknown. Some considerations on this question will form the subject of the present paper: but I think it necessary in the first place to repeat an observation, which I made some years ago; this is, that we form a greatly exaggerated notion of this phænomenon, when we suppose the faculty of producing cold in animals is as striking as that of producing heat. I believe I have proved, that this opinion, which has generally prevailed since the publication of the experiments above-mentioned, is altogether erroneous. In fact, in a number of experiments made in common with my friend Dr. Berger, I constantly found, that the temperature of animals exposed to a higher heat than 35° or 40° cent. (95° or 104° F.) rose in a very striking degree, without however reaching that of the surrounding medium. I frequently observed, that this rise of temperature amounted to 6° or 7° (10·8° or 12·6° F.); and I even ascertained, that, when the external heat is very considerable, this increase of temperature has no limit but the death of the animal, which is its necessary consequence. In these experiments I ascertained the temperature of the animals by a method, of the accuracy of which there can be no doubt; that is, by introducing a considerable way into the rectum the bulb of a thermometer purposely made very small. I found a similar increase of temperature in the human subject, by means of a thermometer introduced into the mouth: and I even observed it very strikingly in a case, where the head could be affected only by means of the circulation; that of a person placed in a box filled with hot vapour, but having his head out of it.

"It follows from these facts, that the faculty of producing cold is much more limited than is commonly supposed; not that it is imaginary. Too many facts attest its existence for it to be doubted: it is desirable, therefore, to ascertain its cause; and this I shall attempt to do.

"I have said above, that some suppose this cause to be the same with that of animal heat; and they ground this opinion on the results of the experiments of Blagden and Fordyce, from which it would seem we may infer, that animals preserve an uniform temperature, whatever may be the heat of the surrounding medium; and that consequently their faculty of producing cold is as decided as that of producing heat. Indeed, if it were thus, it would be natural to conceive this uniformity of temperature as one and the same phænomenon, originating from a single cause: but this not being the precise fact, as I have shown, we may presume the conclusion to be erroneous.

"There is one observation that tends strongly to support this opinion. It is, that cold-blooded animals possess the faculty of preserving a temperature below that of the surrounding medium, when this is elevated, as much or more than warm-blooded animals: though, if this faculty arose from the same cause, as that which produces animal heat, cold-blooded animals should be nearly destitute of it. The truth of this assertion I have shown by several experiments in a former article; and the following, which I lately made, appear to me to render it unquestionable.

"In a stove I exposed to a mean temperature of 45° (113° F.) a rabbit, the temperature of which before the experiment was 39·7° (103·46° F.). After remaining there an hour and forty minutes, it had acquired a temperature of 43·8° (110·84° F.). A frog, exposed in the same stove to a similar heat, acquired in one hour a temperature of 26·7° (80·06° F.); which it preserved during the rest of the time it remained in the stove, being half an hour. The temperature of another frog, exposed to a mean heat of 46·2° (115·16° F.), rose to 28° (82·4° F.), at which it became stationary.

"They who have imagined that there was no necessary connection between the cause of animal heat, and that of the cold sometimes produced in the animals, have supposed, that the latter might be occasioned by the evaporation that takes place, either at the surface of the body, or in the lungs; thus comparing this phænomenon with the cooling of inanimate bodies, the surface of which is wet. For this ingenious comparison we are indebted to Franklin; but is it just? The only experiments made till lately, with a view to solve this question, those of sir C. Blagden and his coadjutors, and those of Dr. Crawford, seem to indicate, that it is not. Those I made myself a few years ago, and of which I have given an account in a prior thesis, led me, on the contrary, to adopt the supposition of Dr. Franklin; though they did not allow me to form a decisive opinion. I have since attempted some new ones, which, confirming the results I had before obtained, appear to me calculated to remove all doubts on the subject. Of these I shall give the results, preceded by a brief account of those I formerly published.

"The principal object of the latter was to ascertain the validity of the objection commonly made to Franklin's theory, that the cooling produced by evaporation is insufficient to explain the difference observed between the temperature of animals exposed to a high degree of heat and that of the surrounding medium. To determine this it was sufficient to examine the comparative influence of heat on the temperature of animals, and on that of inanimate substances wetted all over. For this purpose I exposed at the same time, and side by side, in a stove, various animals, alcarrazas filled with water, and wet sponges. In making this experiment, which I have several times repeated, I constantly observed that the alcarrazas and sponges, whether I introduced them into the stove cold, or previously warmed, assumed a temperature below that acquired by the warm-blooded animals, but nearly the same as that of the cold-blooded. From these results then we may infer, that evaporation is sufficient to produce a refrigeration as great, if not greater, than that observed in animals; and hence we may presume that it is the cause of the latter. It would be wrong, however, to consider the latter as a necessary consequence of the preceding proposition. The possibility of a thing is not a sufficient ground for our concluding that it actually is. Accordingly, when I published these results, I did not pretend to decide that evaporation was the true cause of the phænomenon in question; I merely held out this opinion as plausible; at present I think I can give direct proofs of its justice.

"If evaporation be the sole cause that produces the refrigeration of animals exposed to a high degree of heat, it is evident, that by suppressing it both on the surface of the body and in the interior of the lungs, this refrigeration will be prevented, and the animals must acquire a temperature equal or superior to that of the medium in which they are immersed. If we do not obtain this result, it is a proof of the insufficiency of this cause: if, on the contrary, the means employed for suppressing evaporation being such as not to disturb the exercise of the other functions of the animal, we perceive a cessation of the phænomenon, for which we are endeavouring to account; we may conclude, with equal reason, that it was owing to evaporation.

"This mode of ascertaining the influence of evaporation in this phænomenon naturally offered itself to the minds of those, who have instituted inquiries on the subject. Some experiments have been tried with this view; but they have neither been numerous, nor very decisive. One was by Dr. Fordyce. This gentleman, having introduced a large quantity of aqueous vapour into a heated room, thought he perceived that the heat incommoded him more, but that his temperature remained scarcely the less stationary. It is to be observed, that the time he passed in this room was too short to heat very perceptibly a mass so considerable as that of the human body. No positive inference therefore can be drawn from this experiment, any more than from that in which Dr. Crawford attempted to ascertain the influence of a warm bath on the temperature of a dog; the mode in which he measured this temperature being too inexact, and, besides, the effect of the water being capable of suppressing the cuticular evaporation merely, not the pulmonary. The experiments which the same gentleman tried with frogs, animals in which the pulmonary evaporation must be inconsiderable, would be more decisive, if the results he gives were agreeable to observation. But I have satisfied myself that this is not the case; for several experiments, made with care, have convinced me, that frogs constantly acquire the temperature of the water in which they are immersed, let its heat be what it may, and that in this respect there is no difference between dead and living frogs.

"These are all the experiments, as far as I know, that have been tried to ascertain what would happen, when men or animals are exposed to a high degree of heat, without any evaporation being able to take place from the surface of their bodies. Their insufficiency is evident. New ones therefore cannot be uninteresting, and these I have attempted.

"With this view I had recourse to the means employed by Dr. Fordyce, but with this difference; instead of trying the experiments with man, I employed animals of small size, that their mass might be more quickly heated. In fact, it is well adapted to the end proposed; for it is obvious, that if an animal be placed in air loaded with vapour, there can be no evaporation of the fluid exhaled either on the surface of its body, or from its lungs; and yet it may continue the exercise of its functions as freely as in dry air. The apparatus I employed allowed me to distribute the vapour pretty uniformly throughout the space occupied by the animals, and to regulate the quantity at pleasure.

"Into this apparatus I introduced successively warm-blooded animals of different kinds, and frogs; I exposed them to different degrees of heat: and I carefully examined their temperature, both before and after the experiment, by means of a thermometer introduced into the rectum, or plunged deep into the œsophagus. The results I obtained are given in the following table.

Table of Results obtained on exposing various Animals to a moist Heat, in order to determine the Influence of this Heat on their Temperature.

Exp.	Animal.	Time of remaining in the box filled with vapour.	Mean temperature of the apparatus during the continuance of the experiment.		Temperature of the animal after its exposure to the vapour.		Temperature of the animal previous to its exposure.	
		Minutes.	Cent.	Fahr.	Cent.	Fahr.	Cent.	Fahr.
1	1st rabbit	39	38·7°	101·66°	42·4	108·32°	40·0	104
2	Do.	55	38·7	101·66	43	109·40	39·6	103·28
3	Do.	52	40·7	105·26	43·6	110·48	40·0	104
4	2d rabbit	55	38·7	101·66	42·9	109·22	39·6	103·28
5	Do.	75	38·7	101·66	42·7	108·86	40·0	104
6	Do.	55	40·7	105·26	43·1	109·58	39·7	103·46
7	Guinea pig	56	37·7	99·86	42·7	108·86	39	102·20
8	Do.	55	38·7	101·66	49·9	109·22	39	102·20
9	Do.	48·5	40·7	105·26	43·5	110·30	39·0	102 20
10	Do.	55	40·7	105·26	44·2	111·56	38·4	101·12
11	Pigeon	55	37·7	99·86	43·8	110·84	42·5	108 50
12	Do.	40	40·7	105·26	45	113	41·9	107·42
13	Do.	42	41·9	107·42	46·9	116·42	41·8	107·24
14	1st frog	73	25·6	78·08	26	78·80		
15	2d frog	50	27·2	80·96	27·8	82·04		

" I shall here subjoin some remarks with regard to the observations in this table.

" Beside the experiments, of which I have given the results, I made many others, on the accuracy of which I could not equally depend. Their results, however, were analogous to those in the table.

" Whatever precautions I took to prevent it, there were always some variations in the temperature of the apparatus during the experiment. These variations did not in general exceed one degree (1·8° F.); but sometimes they amounted to 3° (5·4° F.), though for a very short period.

" When I employed the same animal in different experiments, I always suffered at least twenty-four hours to elapse between them.

" The different thermometers I employed not being uniform in their motions, I examined these with care, and formed a particular scale of reduction for each, by means of which I reduced the several results of the different observations to one common scale. Though I have employed tenths of a degree in noting the results, I do not pretend to have been always thus exact in my observations; but I chose rather to express them thus than to commit voluntary errors. The errors I have committed involuntarily, however, cannot at any time have exceeded a quarter of a degree.

" The temperature of an animal previous to its introduction into the apparatus has frequently exhibited trifling differences, the cause of which I could not ascertain.

" It was not easy to ascertain the temperature of the frogs immediately on their being taken out of the box, and without its being influenced by the contact of the hands or the external air. To effect this, I tied the animal on a kind of cart made for the purpose, and placed a thermometer with a very small bulb, so as to remain in its mouth, or rather in its stomach. On opening the box, I had only to take out the cart quickly, and examine the degree indicated by the thermometer.

" On looking at the table we perceive, that the temperature of the warm-blooded animals uniformly rose two or three degrees at least above the moist air, in which they were immersed: whence it is evident, that the faculty of producing cold was annihilated in them, and consequently that this faculty is essentially dependent on evaporation. It is true, that the heat, to which these animals were exposed, did not exceed their natural temperature by two degrees (3·6° F.); and it might be supposed, that the faculty of producing cold would have been displayed by them at higher temperatures. But this objection will vanish, if we consider, that death would have been the necessary consequence of their exposure for a time of any continuance to a moist heat greater than that to which I subjected them, and consequently that this faculty would have been extinguished in them. In fact, however low the heat they endured in these experiments may appear to have been, they were always more or less exhausted by it; and when it was greater, they appeared dying on my taking them out of the apparatus. The guinea pig, though very lively in the morning, died in the evening after experiment 10. I had likewise a rabbit and a pigeon that died after similar experiments, the results of which are not inserted in the table.

" It may be asked perhaps, why the temperature of these animals did not merely rise to an equilibrium with the surrounding fluid, instead of exceeding it by some degrees. The answer to this question is very simple. The exercise of their functions not having been disturbed, the cause, whatever it is, that produces animal heat, must have continued to act on them, and occasion this rise of temperature. It is more difficult to conceive, why this rise was not greater; and why the same cause, which in low temperatures keeps animals at 20°, 40°, or even 80° (36°, 72°, or 144° F.) above that of the surrounding air, does not rise more than 3° or 4° (5·4° or 7·2° F.), when they are exposed to heat. This question cannot be solved, till we have a satisfactory answer to another of great importance, that has been often debated: 'what is the cause of animal heat?' a question which, as may be seen from the facts I have adduced, is not essentially connected with that here discussed.

"In frogs, and I believe it would be the same with other cold-blooded animals, the difference between their temperature and that of the surrounding medium was always much less striking than in warm-blooded animals, as might naturally be expected. This however has afforded me an opportunity of making a remark somewhat curious, but requiring to be confirmed by repeated experiments, namely, that the proper heat of these animals, or the excess of their temperature over that of the surrounding medium, is as considerable when they are exposed to heat, as when they are exposed to cold. This would seem to indicate, that the cause of this heat is not the same as in warm-blooded animals.

"From what has been said we may conclude, that the production of cold, manifested in animals exposed to a high degree of heat, is to be classed with those phænomena, the essential cause of which is physical. In this however we cannot overlook the influence of vital causes, which, as I have announced at the commencement of this paper, concur with the physical causes in the production of almost all the phænomena, that are the result of organization. In fact, the evaporation, that causes this production of cold, cannot take place, unless the surface of the body and of the pulmonary cells be kept constantly moist. And here the comparison of inorganic bodies, such as were employed in my experiments, ceases to be exact. The surfaces of these were moistened by transudation only. Those of animals are moistened by perspiration, a very complex phænomenon, necessarily dependant on the action of the system of capillary vessels. In the former, the surface no sooner begins to dry, than it draws from the interior a new portion of moisture. In the latter, on the contrary, perspiration must acquire a fresh degree of activity, when the heat becomes more considerable; and this can take place only from an increased energy in the exhalant system, and perhaps even throughout the whole of the circulation. It is to be observed, that this increased activity of the perspiration, at least from the surface of the body, is more considerable than is requisite to furnish the increased evaporation. Hence that sweat, which, in most cases, is nothing more than the excess of the fluid perspired above that carried off by evaporation."

TEMPERATURE OF CLIMATES. See CLIMATES.

TE'MPERED. *a.* (from *temper.*) Disposed with regard to the passions (*Shakspeare*).

TEMPERING OF STEEL AND IRON, the rendering of them either more compact and hard, or soft and pliant, according as the different uses for which they are wanted may require. See IRON and STEEL.

TE'MPEST. *s.* (*tempestas*, Lat.) 1. The utmost violence of the wind (*Donne*). 2. Any tumult; commotion; perturbation.

To TE'MPEST. *v. a.* (from the noun.) To disturb as by a tempest (*Milton*).

TE'MPEST-BEATEN. *a.* (*tempest* and *beat.*) Shattered with storms (*Dryden*).

TE'MPEST-TOST. *a.* (*tempest* and *tost.*) Driven about by storm (*Shakspeare*).

TEMPESTI'VITY. *s.* (*tempestivus*, Lat.) Seasonableness (*Brown*).

TEMPE'STUOUS. *a.* (*tempestueux*, Fr. from *tempest.*) Stormy; turbulent (*Collier*).

TEMPLARS, TEMPLERS, or KNIGHTS OF THE TEMPLE, a religious order instituted at Jerusalem in the beginning of the 12th century, for the defence of the holy sepulchre and the protection of Christian pilgrims. They were first called The poor of the Holy City, and afterwards assumed the appellation of Templers, because their house was near the temple. The order was founded by Baldwin II. then king of Jerusalem, with the concurrence of the pope; and the principal articles of their rule were: that they should hear the holy office throughout every day; or that, when their military duties should prevent this, they should supply it by a certain number of paternosters: that they should abstain from flesh four days in the week, and on Fridays from eggs and milk-meats; that each knight might have three horses, and one esquire; and that they should neither hunt nor fowl. After the ruin of the kingdom of Jerusalem about 1186, they spread themselves through Germany and other countries of Europe, to which they were invited by the liberality of the Christians. In the year 1228, this order acquired stability, by being confirmed in the council of Troyes, and subjected to a rule of discipline drawn up by St. Bernard. In every nation they had a particular governor, called master of the temple, or of the militia of the temple. Their grand-master had his residence at Paris.

The order of templars flourished for some time, and acquired, by the valour of its knights, immense riches and an eminent degree of military renown: but as their prosperity increased, their vices were multiplied, and their arrogance, luxury, and cruelty, rose at last to such a monstrous height, that their privileges were revoked, and their order suppressed with the most terrible circumstances of infamy and severity. Their accusers were two of their own body, and their chief prosecutor Philip the Fair of France, who addressed his complaints to Clement V. The pope, though at first unwilling to proceed against them, was under a necessity of complying with the king's desire; so that, in the year 1307, upon an appointed day, and for some time afterwards, all the knights, who were dispersed thoughout Europe, were seized and imprisoned, and many of them, after trials for capital crimes, were convicted and put to death. In 1312 the whole order was suppressed by the council of Vienne. A part of the rich revenues they possessed was bestowed upon other orders, especially on the knights of St. John, now of Malta, and the rest confiscated to the respective treasuries of the sovereign princes in whose dominions their possessions lay.

Te'mplar. *s.* (from the *Temple.*) A student in the law (*Pope*).

TE'MPLE. *s.* (*temple*, Fr. *templum*, Lat.) 1. A place appropriated to acts of religion (*Shakspeare*). 2. (*tempora*, Lat.) The upper part of the sides of the head (*Wiseman*).

Temple (William), a celebrated English statesman, was the son of sir William Temple, master of the rolls in Ireland, and born in London, in 1629. He received the first part of his education under his maternal uncle Dr. Henry Hammond, and then was removed to the school at Bishop's Stortford, whence he went to Emanuel college, Cambridge. In 1648 he went on his travels, and returned to England in 1654. On the restoration of Charles II. he became a member of the parliament of Ireland, but soon left that kingdom, and settled in England. He rendered his country important services as ambassador to the United States, particularly in effecting the triple league between England, Holland, and Sweden, in 1688, and in bringing about the marriage of the prince of Orange to lady Mary, daughter of the duke of York. In 1680 he retired from public affairs, and divided his time between his books and his gardens, but he was often consulted by the persons who managed the government, and was often visited by king William. He died at his seat of Moor Park, in Surrey, in 1700. His works consist of Memoirs of what passed in his public employment; Letters; Miscellanies; and Observations on the United Provinces of the Netherlands; making in all 2 vols. folio.

Temple. (*templum.*) A public building, erected in honour of some deity, either true or false; and wherein the people meet to pay religious worship to the same. The word is formed from the Latin *templum*, which some derive from the Greek τεμενος, signifying the same thing; and others from τεμνω, *abscindo*, I cut off, I separate, because a temple is a place separated from common uses: others with more probability derive it from the old Latin word *templare*, to contemplate. It is certain the ancient augurs gave the name *templa* to those parts of the heavens which were marked out for the observation of the flight of birds. Their formula was this: *templa tesqua sunto.* Temples were originally all open, and hence received their name. See Phil. Trans. Nº 471. sect. 5. where we have an account of an ancient temple in Ireland of the same sort as our famous Stonehenge. The word *templum*, in its primary sense, among the old Romans, signified nothing more than a place set apart and consecrated by the augurs, whether inclosed or open, in the city or in the fields.

Clemens Alexandrinus and Eusebius refer the origin of temples to the sepulchres built for the dead. This notion has been lately illustrated and confirmed by a variety of testimonies by Mr. Farmer in his Treatise on the Worship of Human Spirits, p. 373, &c. Herodotus and Strabo will have the Egyptians to have been the first who built temples to the gods. The first erected in Greece is ascribed to Deucalion, by Apollonius, Argonaut. lib. iii. In antiquity we meet with many people who would not build any temples to their gods for fear of confining them to too narrow bounds. They performed their sacrifices in all places indifferently, from a persuasion that the whole world is the temple of God, and that he required no other. This was the doctrine of the magi, followed by the Persians, the Scythians, the Numidians, and many other nations mentioned by Herodotus, lib. 1. Strabo, lib. xv. and Cicero in his second oration against Verres.

The Persians, who worship the sun, believed it would wrong his power to inclose him in the walls of a temple, who had the whole world for his habitation; and hence, when Xerxes ravaged Greece, the magi exhorted him to destroy all the temples he met with. The Sicyonians would build no temple to their goddess Coronis; nor the Athenians, for the like reason, erect any statue to Clemency, who, they said, was to live in the hearts of men, not within stone walls. The Bithynians had no temples but the mountains to worship on; nor had the ancient Germans any other but the woods. Even some philosophers have blamed the use and building of temples, particularly Diogenes, Zeno, and his followers the Stoics. But it may be said, that if God hath no need of temples, men have need of places to meet in for the public offices of religion: accordingly temples may be traced back even into the remotest antiquity. See Hospinian de Origine Templorum.

The Romans had several kinds of temples; whereof those built by the kings, &c. consecrated by the augurs, and wherein the exercise of religion was regularly performed, were called, by way of eminence, *templa*, temples. Those that were not consecrated were called *ædes*. The little temples, that were covered or roofed, they called *ædiculæ*. Those open, *sacella*. Some other edifices, consecrated to particular mysteries of religion, they called *fana* and *delubra*. All these kinds of temples, Vitruvius tells us, had other particular denominations, according to the form and manner of their construction, as will be hereafter specified. Indeed the Romans outdid all nations with regard to temples: they not only built temples to their gods, to their virtues, to their diseases, &c. but also to their emperors, and that in their lifetime; instances whereof we meet with in medals, inscriptions, and other monuments. Horace compliments Augustus hereupon, and sets him above Hercules and all the heroes of fable; because those were admitted into temples only after their death, whereas Augustus had his temples and altars while living.

> *Præsenti tibi maturos largimur honores;*
> *Jurandasque tuum per nomen ponimus aras.*
> Epist. ad Aug.

Suetonius, on this occasion, gives an instance of the modesty of that emperor, who would allow of no temples being erected to him in the city; and even in the provinces, where he knew it was usual to raise temples to the very proconsuls, refused any but those erected in the name of Rome as well as his own. The most celebrated temples among the Romans were the Capitol and Pantheon. They had also the temple of Saturn, which served for the public treasury; and the temple of Janus.

The temple of Jerusalem was similar in its plan to the Tabernacle. The first temple was begun by Solomon about the year of the world 2992, and before Christ 1012 according to some chronologers, and finished in eight years. Great mistakes have been committed respecting the dimensions of this temple, by confounding the emblematical description of Ezekiel with the plain account of it in the books of Kings and Chronicles. It consisted of the holy of holies, the sanctuary, and a portico. The holy of holies was a square room of 20 cubits; the sanctuary, or holy place, was 40 cubits long and 20 broad, consequently the length of both these together was 60 cubits. The portico, which stood before the sanctuary, was 20 cubits long and 10 cubits broad. Whether the portico was separated by a wall from the rest of the temple or not, is not mentioned in scripture. If it was, the whole length of the temple, computing the cubit at 22 inches, did not exceed 110 feet in length and 36 feet 8 inches in breadth. In the portico stood the two brazen pillars called Jachin and Boaz, which, upon comparing and reconciling the seemingly different account in different places, appear to have been 40 cubits high and about 4 cubits diameter. The court probably at first extended all round the temple. Now we are told, that the court about the tabernacle was 100 cubits long and 50 broad; and as Solomon made every part of the temple about twice as large as the corresponding part in the tabernacle, we have reason to conclude, that the court around the temple was 200 cubits long and 100 broad. According to this description, which is taken from the scripture history, the temple of Solomon was by no means so large as it is commonly represented. Still, however, it was very magnificent in size, and splendid in ornament. It was plundered of its treasures in the reign of Rehoboam, and repaired by Joash; it was again spoiled in the time of Ahaz and of Hezekiah; and after being restored by Josiah, was demolished by Nebuchadnezzar in the year of the world 3416, after it had stood 476 years according to Josephus, and according to Usher 428 years.

The second temple was built by the Jews, after their return from the Babylonish captivity, under the direction and influence of Zerubbabel their governor, and of Joshua the high-priest, with the leave and encouragement of Cyrus the Persian emperor, to whom Judea was now become a tributary kingdom. According to the Jews, this temple was destitute of five remarkable appendages, which were the chief glory of the first temple; viz. the ark and mercy-seat, the shechinah, the holy fire on the altar, which had been first kindled from heaven, the urim and thummim, and the spirit of prophecy. This temple was plundered and profaned by Antiochus Epiphanes, who also caused the public worship in it to cease; and afterwards purified by Judas Maccabæus, who restored the divine worship; and after having stood five hundred years, rebuilt by Herod, with a magnificence approaching to that of Solomon's. Tacitus calls it *immensæ opulentiæ templum*; and Josephus says, it was the most astonishing structure he had ever seen, as well on account of its architecture as its magnitude, and likewise the richness and magnificence of its various parts and the reputation of its sacred appurtenances. This temple, which Herod began to build about sixteen years before the birth of Christ, and so far completed in nine years and a half as to be fit for divine service, was at length destroyed by the Romans on the same month and day of the month on which Solomon's temple was destroyed by the Babylonians.

The Indian temples, or pagodas, are sometimes of a prodigious size. They are commonly erected near the banks of the Ganges, Kistna, or other sacred rivers, for the benefit of ablution in the purifying stream. Where no river flows near the foot of the pagoda, there is invariably in the front of it a large tank or reservoir of water. These are, for the most part, of a quadrangular form, are lined with freestone or marble, have steps regularly descending from the margin to the bottom, and Mr. Crauford observed many between three and four hundred feet in breadth. At the entrance of all the more considerable pagodas there is a portico, supported by rows of lofty columns, and ascended by a handsome flight of stone steps; sometimes, as in the instance of Tripetti, to the number of more than a hundred. Under this portico, and in the courts that generally inclose the whole building, an innumerable multitude assemble at the rising of the sun; and, having bathed in the stream below, and, in conformity to an immemorial custom over all the East, having left their sandals on the border of the tank, impatiently await the unfolding of the gates by the ministering brahmin. The gate of the pagoda universally fronts the east, to admit the first ray of the solar orb; and, opening, presents to the view an edifice partitioned out, according to M. Thevenot in his account of Chitanagar, in the manner of the ancient cave-temples of Elora, having a central nave or body; a gallery ranging on each side; and, at the farther end, a sanctuary, or chapel of the deity adored, surrounded by a stone balustrade to keep off the populace. Those who wish to peruse a more particular account of the Indian temples may consult Maurice's Indian Antiquities.

Temple, in architecture. The ancient temples were distinguished, with regard to their construction, into various kinds; as, *Temple in antæ, Ædes in antis.* These, according to Vitruvius, were the most simple of all temples, having only angular pilasters, called *antæ* or *parastatæ*, at the corners, and two Tuscan columns on each side of the doors. *Temple, tetrastyle*, or *simple tetrastyle*, was a temple that had four columns in front and as many behind. Such was the temple of Fortuna Virilis at Rome. *Temple, prostyle*, that which had only columns in its front or foreside; as that of Ceres at Eleusis in Greece. *Temple, amphiprostyle*, or *double prostyle*, that which had columns both before and behind, and which was also tetrastyle. *Temple, periptere*, that which had four rows of insulated columns around, and was exhastyle, i. e. had six columns in front; as the temple of Honour at Rome. *Temple, diptere*, that which had two wings and two rows of columns around, and was also octostyle, or had eight columns in front; as that of Diana at Ephesus.

Temples, among us, denote two inns of court in London, thus called, because anciently the dwelling-houses of the knights-templars. At the suppression of that order, they were purchased by the professors of the common law, and converted into *hospitia* or inns. They are called the Inner and Middle Temple, in relation to Essex-house; which was also a part of the house of the templars, and called the Outer Temple, because situated without Temple-Bar. In the Middle Temple, during the time of the templars, the king's treasure was kept; as was also that of the kings of France in the house-templars at Paris. The chief officer was the master of the Temple, who was summoned to parliament in 47 Hen. III. and from him the chief minister of the Temple church is still called master of the Temple.

TEMPLEMAN (Peter), a learned physician, was born at Dorchester in 1711, and educated at the Charter-house, and at Trinity college, Cambridge. In 1739 he went to Leyden, and studied under Boerhaave, and three years afterwards returned to England, and entered on practice at London. On the establishment of the British Museum, in 1753, he was appointed keeper of the reading-room, which office he resigned in 1760, on being chosen secretary to the Society for promoting Arts, Manufactures, and Commerce. He died in 1769. Dr. Templeman translated Norden's Travels in Egypt, and other works. He is also the author of some poetical pieces.

TE'MPLET. *s.* A piece of timber in a building (*Moxon*).

TE'MPORAL. *a.* (*temporal*, Fr. *temporalis*, low Lat.) 1. Measured by time; not eternal (*Hooker*). 2. Secular; not ecclesiastical (*Swift*). 3. Not spiritual (*Rogers*). 4. Placed at the temples (*Arbuthnot*).

Temporal artery. Arteria temporalis. A branch of the external carotid, which runs on the temples and give off the frontal artery.

Temporal bones. Ossa temporalia. Ossa temporum. These two bones, which are situated one on each side of the head, are of a very irregular figure. They are usually divided into two parts, one of which, from the manner of its connexion with the neighbouring bones, is called os squamosum, and the other os petrosum, from its irregularity and hardness.

In both these parts there are processes and cavities to be described. Externally there are three processes; one anterior, called zygomatic process, which is stretched forwards to join with the os malæ, and thus forms the bony jugum under which the temporal muscle passes; one posterior, called the mastoid or mamillary process, from its resemblance to a nipple; and one inferior, called the styloid process, from its shape, which is said to resemble that of the ancient stylus scriptorius. In young subjects this process is united with the bone by an intermediate cartilage, which sometimes, even in adults, is not completely ossified. Three muscles have their origin from this process, and borrow half of their names from it, viz. stylo-glossus, stylo-hyoideus, and stylo-pharyngeus. Round the root of this process there is a particular rising of the os petrosum, which some writers describe as a process, and, from its appearance with the styloid, have named it vaginalis; others describe the semi-circular ridge of the meatus auditorius externus as a fifth process, to which they give the name of auditory. The depressions and cavities are, 1. A large fossa, which serves for the articulation of the lower jaw; it is situated between the zygomatic, auditory, and vaginal processes, and is separated in its middle by a fissure into which the ligament that secures the articulation of the lower jaw with this bone is fixed. The fore part of this cavity, which receives the condyle of the jaw, is covered with cartilage; the back part only with the periosteum. 2. A long fossa behind the mastoid process, where the digastric muscle has its origin. 3. The meatus auditorius externus, the name given to a large funnel-like canal that leads to the organ of hearing. 4. The stylo-mastoid hole, so called from its situation between the styloid and mastoid processes. It is likewise called the aqueduct of Fallopius, and affords a passage to the portio dura of the auditory or seventh pair of nerves. 5. Below and on the fore part of the last foramen we observe part of the jugular fossa, a thimble-like cavity, in which the beginning of the internal jugular vein is lodged. 6. Before, and a little above this fossa, is the orifice of a foramen, through which pass the internal carotid artery and two filaments of the intercostal nerve. This conduit runs first upward and then forward, forming a kind of elbow, and terminates at the end of the os petrosum. 7. At this part of the ossa temporum we observe the orifice of a canal which runs outwards and backwards in an horizontal direction, till it terminates in the cavity of the ear called tympanum. This canal, which in the recent subject is continued from the ear to the mouth, is called the Eustachian tube. 8. A small hole behind the mastoid process, which serves for the transmission of a vein to the lateral sinus. But this, like other foramina in the scull that serve only for the transmission of vessels, is neither uniform in its situation, nor to be met with in every subject. The internal surface of these bones may easily be divided into three parts. The first, uppermost and largest, is the squamous part, which is slightly concave from the impression of the brain. Its semi-circular edge is sloping, so that the external lamella of the bone advances farther than the internal, and thus rests more securely on the parietal bones. The second and middlemost, which is the petrous part of the bone, forms a hard, craggy protuberance, nearly of a triangular shape. On its posterior side we observe a large foramen, which is the meatus auditorius internus; it receives the double nerve of the seventh pair, viz. the portio dura and portio mollis of that pair. About the middle of its anterior surface is a small foramen, which opens into the aqueduct of Fallopius, and receives a twig of the portio dura of the seventh pair of nerves. This foramen having been first described by Fallopius, and by him named hiatus, is sometimes called hiatus Fallopii. Besides these, we observe other smaller holes for the transmission of blood-vessels and nerves. Below this craggy protuberance is the third part, which, from its shape and connexion with the os occipitis by means of the lambdoidal suture, may be called the lambdoidal angle of the temporal bone. It is concave, from the impression of the brain; it helps to form the posterior and inferior fossæ of the scull, and has a considerable furrow, in which is lodged part of the lateral sinus. The temporal bones differ a little in their structure from the other bones of the cranium. At their upper parts they are very thin, and almost without diploë, but below they have great strength and thickness. In the fœtus, the thin upper part, and the lower craggy part, are separated by a cartilaginous substance; there is no appearance either of the mastoid or styloid processes, and, instead of a long funnel-like meatus auditorius externus, there is only a smooth bony ring, within which the membrana tympani is fastened. Within the petrous part of these bones there are several cavities, processes, and bones, which belong altogether to the ear, do not enter into the formation of the cranium, and are described under the article Ear.

The ossa temporum are connected by suture with the ossa parietalia, the os occipitis, the ossa malarum, and the os sphenoides, and are articulated with the lower jaw.

TEMPORALIS, in myology. This muscle, which Winslow has named the crotaphyte, arises fleshy from the lower, lateral, and anterior part of the parietal bone; from all the squamous portion of the temporal bone; from the lower and lateral part of the os frontis; from the posterior surface of the os malæ; from all the temporal process of the sphenoid bone; and sometimes from a ridge at the lower part of this process. This latter portion, however, is often common to this muscle and the pterygoideus externus. It is of a semi-circular shape, and its radiated fibres converge, so as to form a strong middle tendon, which passes under the jugum, and is inserted into the coronoid process of the lower jaw, to which it adheres on every side, but more particularly at its fore part, where the insertion is continued down to the body of the bone. This muscle is covered by a pretty strong fascia, which some writers have erroneously described as a part of the aponeurosis of the occipito-frontalis. This fascia adheres to the bones, round the whole circumference of the origin of the muscle, and, descending over it, is fixed below to the ridge where the zygomatic process begins, just above the meatus auditorius; to the upper edge of the zygomatic process itself, and anteriorly to the os malæ. This fascia serves as a defence to the muscle, and likewise gives origin to some of its fleshy fibres. The principal use of the temporal muscle is to draw the lower jaw upwards, as in the action of biting; and as it passes a little forwards to its insertion, it may at the same time pull the condyle a little backwards, though not so much as it would have done if its fibres had passed in a direct line from their origin to their insertion, because the posterior and lower part of the muscle passes over the root of the zygomatic process, as over a pulley.

TEMPORA'LITY. TE'MPORALS. *s.* (*temporalité*, Fr. from *temporal.*) Secular possessions; not ecclesiastic rights (*Bacon*).

TE'MPORALLY. *ad.* (from *temporal.*) With respect to this life (*South*).

TE'MPORALTY. *s.* (from *temporal.*) 1. The laity; secular people (*Abbot*). 2. Secular possessions.

TEMPORA'NEOUS. *a.* (*temporis*, Lat.) Temporary.

TEMPORA'RINESS. *s.* (from *temporary.*) The state of being temporary.

TE'MPORARY. *a.* (*tempus*, Lat.) Lasting only for a limited time (*Addison*).

To TE'MPORIZE. *v. n.* (*temporiser*, Fr.) 1. To delay; to procrastinate (*Shakspeare*). 2. To comply with the time, or occasions.

TEMPORI'ZER. *s.* (*temporiseur*, French, from *temporize.*) One that complies with times or occasions; a trimmer (*Shakspeare*).

To TEMPT. *v. a.* (*tento*, Lat. *tenter*, Fr.) 1. To solicit to ill; to incite by presenting some pleasure or advantage to the mind (*Shakspeare*). 2. To provoke (*Shakspeare*). 3. To solicit; to draw (*Gay*). 4. To try; to attempt (*Dryden*).

TE'MPTABLE. *a.* (from *tempt.*) Liable to temptation; obnoxious to bad influence.

TEMPTA'TION. *s.* (*tentation*, Fr. from *tempt.*) 1. The act of tempting; solicitation to ill; enticement (*Milton*). 2. The state of being tempted (*Duppa*). 3. That which is offered to the mind as a motive to ill (*Dryden*).

TE'MPTER. *s.* (from *tempt.*) 1. One who solicits to ill; an enticer (*Shakspeare*). 2. The infernal solicitor to evil (*Hammond*).

TEMSE BREAD. Te'msed bread. *s.* (*temsen*, *tems*, Dutch.) Bread made of flower better sifted than common.

TE'MULENCY. *s.* (*temulentia*, Latin.) Inebriation; intoxication by liquor.

TE'MULENT. *a.* (*temulentus*, Lat.) Inebriated; intoxicated as with strong liquors.

TEN. *a.* (ꞇẏn, Saxon; *tien*, Dutch.) The decimal number; twice five.

TE'NABLE. *a.* (*tenable*, Fr.) Such as may be maintained against opposition; such as may be held against attacks (*Clarendon*).

TENA'CIOUS. *a.* (*tenax*, Lat.) 1. Grasping hard; inclined to hold fast; not willing to let go (*South*). 2. Retentive (*Locke*). 3. (*tenace*, Fr.) Having parts disposed to adhere to each other; cohesive (*Newton*). 4. Niggardly; close fisted (*Ainsworth*).

TENA'CIOUSLY. *ad.* With disposition to hold fast (*Glanville*).

TENA'CIOUSNESS. *s.* Unwillingness to quit, resign, or let go.

TENA'CITY. *s.* (*tenacité*, Fr. *tenacitas*, Lat.) Viscosity; glutinousness; adhesion of one part to another.

Tenacity, is usually employed by philosophers to denote that quality of bodies by which they sustain a considerable pressure or force without breaking; and is the opposite quality to fragility or brittleness.

TENAILLE, in fortification, a kind of outwork, consisting of two parallel sides, with a front, having a re-entering angle. In fact, that angle, and the faces which compose it, are the tenaille.

The tenaille is of two kinds, simple and double.

Simple, or single tenaille, is a large outwork, consisting of two faces or sides, including a re-entering angle.

Double, or flanked tenaille, is a large outwork, consisting of two simple tenailles, or three saliant and two re-entering angles.

The great defects of tenailles are, that they take up too much room, and on that account are advantageous to the enemy; that the re-entering angle is not defended; the height of the parapet preventing the seeing down into it, so that the enemy can lodge there under cover; and the sides are not sufficiently flanked. For these reasons, tenailles are now mostly excluded out of fortification by the best engineers, and never made but where time does not serve to form a hornwork.

Tenaille of the place, is the front of the place, comprehended between the points of two neighbouring bastions; including the curtain, the two flanks raised on the curtain, and the two sides of the bastions which face one another. So that the tenaille, in this sense, is the same with what is otherwise called the face of a fortress.

Tenaille of the ditch, is a low work raised before the curtain, in the middle of the foss or ditch; the parapet of which is only two or three feet higher than the level ground of the ravelin.

The use of tenailles in general is to defend the bottom of the ditch by a grazing fire, and likewise the level ground of the ravelin, which cannot be so conveniently defended from any other place.

TE'NANCY. *s.* (*tenanche*, old Fr.) Temporary possession of what belongs to another.

TE'NANT. *s.* (*tenant*, Fr.) 1. One that holds of another; one that on certain conditions has temporary possession and use of the property of another (*Pope*). 2. One who resides in any place (*Thomson*).

To Te'nant. *v. a.* (from the noun.) To hold on certain conditions (*Addison*).

TE'NANTABLE. *a.* (from *tenant.*) Such as may be held by a tenant (*Suckling*).

TE'NANTLESS. *a.* (from *tenant.*) Unoccupied; unpossessed (*Shakspeare*).

TE'NANT-SAW. See Tenon.

TENBY, a seaport of Wales, in Pembrokeshire, with a market on Wednesday and Saturday. Its castle was demolished in the civil wars. The principal trade is in coal, and it is a place of fashionable resort for bathing. Four miles W.S.W. on the seacoast, are the massive remains of Manorbeer castle. Tenby is seated on a narrow rock projecting into the sea, 10 miles E. of Pembroke, and 253 W. of London. Lon. 4. 40 W. Lat. 51. 44 N.

TENCH, in ichthyology. See Cyprinus.

Tench Island, an island in the Pacific ocean, two miles in circumference, discovered by lieutenant Ball, in 1790. It is low, but entirely covered with trees, many of which are the cocoa-nut. The natives, observed in their canoes, were remarkably stout men, quite naked, and of a copper colour; some with long beards. Lon. 151. 31 E. Lat. 1. 39 S.

To TEND. *v. a.* (contracted from *attend.*) 1. To watch; to guard; to accompany as an assistant or defender (*Pope*). 2. To attend; to accompany (*Swift*). 3. To be attentive to (*Milton*).

To Tend. *v. n.* (*tendo*, Lat.) 1. To move toward a certain point or place (*Wotton*). 2. (*tendre*, Fr.) To be directed to any end or purpose; to aim at (*Tillotson*). 3. To contribute (*Hammond*). 4. To wait; to expect: out of use (*Shakspeare*). 5. To attend; to wait as dependants or servants (*Shakspeare*). 6. To attend as something inseparable (*Shakspeare*).

TE'NDANCE. *s.* (from *tend.*) 1. Attendance; state of expectation (*Spenser*). 2. Persons attendant (*Shakspeare*). 3. Attendance; act of waiting (*Shakspeare*). 4. Care; act of tending (*Milton*).

TE'NDENCE. Te'ndency. *s.* (from *tend.*) 1. Direction or course toward any place or object (*Taylor*). 2. Direction or course toward any inference or result; drift (*Locke*).

TE′NDER. *a.* (*tendre*, Fr.) 1. Soft; easily impressed or injured (*Milton*). 2. Sensible; easily pained; soon sore (*Locke*). 3. Effeminate; emasculate; delicate (*Spenser*). 4. Exciting kind concern (*Shakspeare*). 5. Compassionate; anxious for another's good (*Hooker*). 6. Susceptible of soft passions (*Spenser*). 7. Amorous; lascivious (*Hudibras*). 8. Expressive of the softer passions. 9. Careful not to hurt (*Tillotson*). 10. Gentle; mild; unwilling to pain (*Shakspeare*). 11. Apt to give pain (*Bac.*). 12. Young; weak: as, *tender* age.

To TE′NDER. *v. a.* (*tendre*, Fr.) 1. To offer; to exhibit; to propose to acceptance (*Milton*). 2. To hold; to esteem (*Shakspeare*). 3. (from the adjective.) To regard with kindness: not in use (*Shakspeare*).

TE′NDER. *s.* (from the verb.) 1. Offer; proposal to acceptance (*South*). 2. Regard; kind concern: not used (*Shakspeare*). 3. A small ship attending on a larger.

TE′NDERHEARTED. *a.* (*tender* and *heart.*) Of a soft compassionate disposition.

TE′NDERLING. *s.* (from *tender.*) 1. The first horns of a deer. 2. A fondling.

TE′NDERLY. *ad.* (from *tender.*) In a tender manner; mildly; gently; softly; kindly; without harshness (*Milton*).

TE′NDERNESS. *s.* (*tendresse*, French.) 1. The state of being tender; susceptibility of impressions (*Arbuthnot*). 2. State of being easily hurt; soreness (*Addison*). 3. Susceptibility of the softer passions (*Shakspeare*). 4. Kind attention; anxiety for the good of another (*Bacon*). 5. Scrupulousness; caution (*Wotton*). 6. Cautious care (*Government of the Tongue*). 7. Soft pathos of expression.

TE′NDINOUS. *a.* (*tendinis*, Lat.) Sinewy; containing tendons (*Wiseman*).

TENDON. (from *tendo*, to stretch.) In anatomy, the white and glistening extremity of a muscle. See MUSCLE and ANATOMY.

TENDRIL, or CLASPER. Cirrus. In botany, one of the fulcres. A filiform spiral band, by which a plant is fastened to another body, or by which a weak plant supports itself on others: as the vine, pea, &c.

A tendril is,

1. Axillary, from the axil.
2. Foliary, from the leaf.
3. Petiola, from the petiole or foot-stalk.
4. Peduncular, from the peduncle or stalk.

Or it is,

1. Simple.
2. Trifid, or three-cleft.
3. Multifid, many-cleft.
4. Diphyllous, tetraphyllous, &c. Two-leaved, four-leaved, &c.
5. Polyphyllous, many-leaved.
6. Convolute, turned inward.
7. Revolute, turned back after having made half a turn.

TENE′BRICOSE. TE′NEBRIOUS. *a.* (*tenebricosus*, *tenebrosus*, Lat.) Dark; gloomy.

TENEBRIO. Darkling. In zoology, a genus of the class insecta, order coleoptera. Antennas moniliform, the last joint roundish; thorax plano-convex, margined; head projecting; shells rather rigid. Eighty-nine species; thus divided into sections.

A. Feelers six, filiform; fore-shanks formed for digging.

α. Lip horny, entire; constituting the tribe scaurus of Fabricius.

ϐ. Lip horny, toothed: the tribe scarites of Fabricius.

B. Feelers four.

α. Lip truncate, entire; the tribe tenebrio of Fabricius: it constitutes the largest division.

ϐ. Lip horny, bifid: the tribe trogosita of Fabricius.

γ. Jaw membranaceous, bifid: the tribe lyctus of Fabricius.

δ. Jaw horny, one-toothed: the tribe sagra of Fabricius.

These insects are commonly of a dark sombre colour: some have wings under their shells, while others are apterous. The larves of some species reside among rotten sticks, or rubbish; those of others take up their abode among flour, and different kinds of food. After they have become perfect insects, they enter houses and devour every sort of provision. Their principal resort is to damp cellars, where putrid air and darkness attract them. It is from their precipitately avoiding light, as well as their gloomy appearance, that they derive their generic name. We shall select a few specimens.

1. T. mortisagus. This sable animal is found among rubbish and dung in gardens; when it enters houses, as is frequently the case, the credulous believe it the certain forerunner of death. It is entirely of a deep black, without the least lustre: the antennas are long; thorax margined; wing-shells wrinkled. This, as well as some other species, is remarkable for emitting a fetid smell.

2. T. mollitor. Oblong, piceous; shells striate. Found in meal and bread. The larve is soft and white, and is eagerly sought after by nightingales.

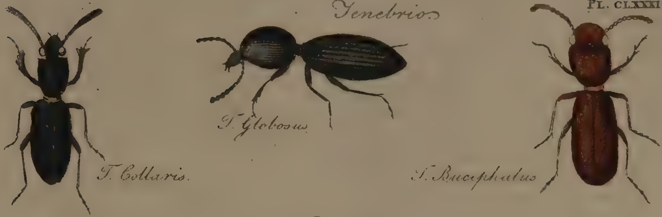
3. T. minutus. Black: antennas and legs ferruginous; thorax flat, oblong, punctured: varies in having the body entirely ferruginous. Inhabits Europe on agarics growing on trees: and, like both the preceding, found in our own country. See Nat. Hist. Pl. CLXXXI.

TENEBRO′SITY. *s.* (*tenebræ*, Lat.) Darkness; gloom.

TENEDOS, a small fertile island of the Ægean sea, opposite Troy, at the distance of about 12 miles from Sigæum, and 56 miles north from Lesbos. It became famous during the Trojan war, as it was there that the Greeks concealed themselves the more effectually to make the Trojans believe that they were returned home without finishing the siege. This island is 11 miles long and seven broad, inhabited almost wholly by Greeks, and its muscadine wine is the best in all the Levant. On

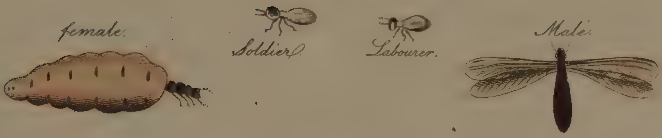
NATURAL HISTORY.

Tenebrio

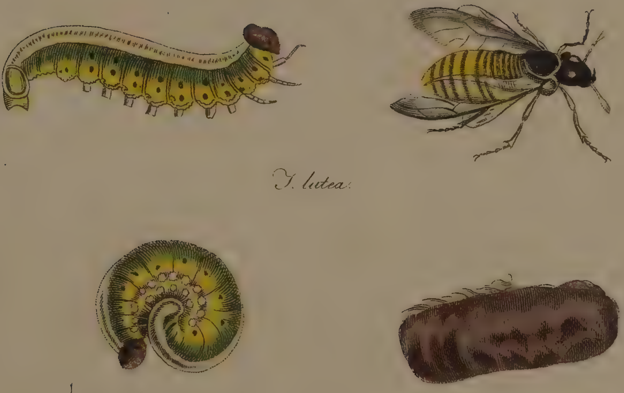


Termes
or White Ant

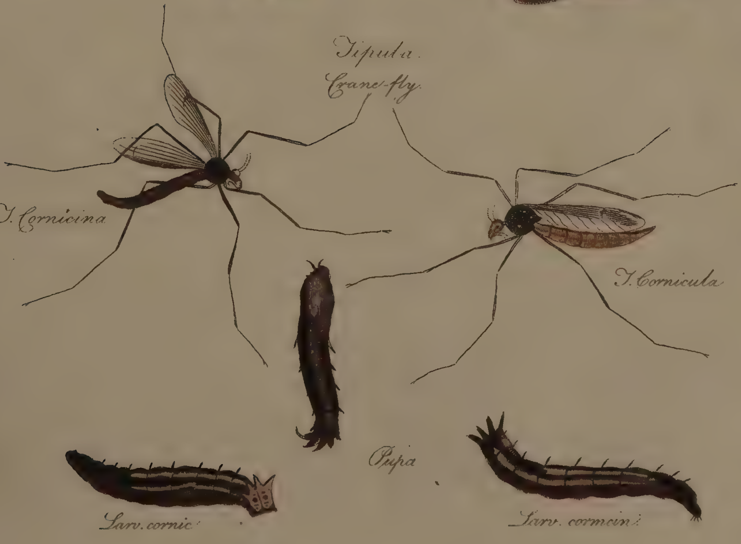
T. arborum or T. destructor.



Tenthredo.
Saw-fly.



Tipula.
Crane-fly.



London, Published by Sherwood & Co. Paternoster Row, Aug. 1st 1811.

the E. side is the town, at the foot of a mountain, with a harbour, defended by a castle. Lon. 26. 0 E. Lat. 39. 50 N.

TE'NEMENT. *s.* (*tenement*, Fr. *tenementum*, law Latin.) Any thing held by a tenant (*Pope*).

TE'NENT. *s.* See Tenet.

TENERIF, one of the Canary islands, and the most considerable of them for riches, trade, and population. It lies W. of the Grand Canary, is 70 miles long and 22 broad, and abounds in wine, different sorts of fruits, cattle, and game. One part of this island is surrounded by inaccessible mountains, and one in particular, called the Pike of Teneriffe, is 12,138 feet above the level of the sea: and the distance to the Peak from the port of Oratavia, at the base of the mountain, is above 11 miles. This island is subject to earthquakes; and, in 1704, one destroyed several towns, and many thousand people. The laborious works in this island are chiefly performed by oxen and mules, horses being scarce, and reserved for the use of the officers. Hawks and parrots are natives of the island, as also swallows, seagulls, partridges, canary-birds, and blackbirds. There are also lizards, locusts, and dragonflies. St. Christophé de Laguna is the capital, but the governor resides at St. Cruz.

Tenerif, a town of Terra Firma, in the province of St. Martha, seated on the Madalena, 100 miles S.S.W. of St. Martha. Lon. 74. 15 W. Lat. 9. 47 N.

TENE'RITY. *s.* (*teneritas*, *tener*, Latin.) Tenderness (*Ainsworth*).

TENES, a son of Cycnus and Proclea. He was exposed on the sea on the coast of Troas, by his father, who credulously believed his wife Philonome, who had accused him of attempts upon her virtue, when he refused to gratify her passion. Tenes arrived safe in Leucaphrys, which he called Tenedos, and of which he became the sovereign. Cycnus discovered the guilt of his wife Philonome, and wishing to be reconciled to his son, he went to Tenedos. But when he had tied his ship to the shore, Tenes cut off the cable with a hatchet, and suffered his father's ship to be tossed about in the sea. Hence the hatchet of Tenes is become proverbial to intimate a resentment that cannot be pacified. This hatchet was carefully preserved at Tenedos, and afterwards deposited in the temple of Delphi, where it was still seen in the age of Pausanias. Tenes was killed by Achilles, as he defended his country against the Greeks, and he received divine honours after death.

TENESMUS. (*τεινεσμος*, from *τεινω*, to constringe; so called from the perception of a continual constriction or bound state of the part.) A continual inclination to go to stool, without a discharge. See Medicine.

TE'NET. *s.* (from *tenet*, Lat. *he holds.* It is sometimes written *tenent*, or *they hold.*) Position; principle; opinion (*South*).

TENEZ, or Tenis, a town of Algiers, in the province of Mascara, capital of a district of its name, with a fort. The chief export is corn; but here is no harbour, and the road is exposed to the N. and W. winds. It is seated on a river, four miles from the sea, and 85 W.S.W. of Algiers. Lon. 1. 14 E. Lat. 36. 26 N.

TE'NFOLD. *a.* (*ten* and *fold.*) Ten times increased (*Milton*).

TENIERS (David), the elder, a Flemish painter, born at Antwerp in 1582. He received the first rudiments of his art from the famous Rubens, who highly esteemed him for his promising genius, and with great satisfaction examined and commended his designs. From the school of that celebrated painter Teniers went to finish his studies at Rome. He attached himself to Adam Elsheimer for six years; and from the instructions of two such incomparable masters, he formed to himself a peculiar style, which his son cultivated so happily afterward as to bring it to the utmost perfection. His pictures were small; and his subjects usually shops, elaboratories, humorous conversations, and rural festivities. The demand for his pieces was universal; and even his master Rubens thought them an ornament to his cabinet. He died at Antwerp in 1649.

Teniers (David), the younger, also an admirable painter, was the son of the former, and was born at Antwerp in 1610. He obtained the name of ape of painting, from his imitating the manner of different painters with such exactness as to deceive even the nicest judges. He improved greatly under his father, and obtained such reputation as introduced him to the favour of the great. The archduke Leopold William made him gentleman of his bedchamber; and all the pictures of his gallery were copied by Teniers, and engraved by his direction. The king of Spain and Don Juan of Austria set so high a value on his pictures, that they built a gallery on purpose for them. William prince of Orange honoured him with his friendship: and Rubens not only esteemed his works, but assisted him with his advice. His principal talent lay in landscapes adorned with small figures. He also painted men drinking and smoking, chymists' elaboratories, country fairs, and the like. His small figures are superior to his large ones. He died in 1694.

The works of the father and son are thus distinguished: the latter discover a finer touch and fresher pencil, greater variety of attitudes, and a better disposition of the figures. The father retained something of the tone of Italy in his colouring, which was stronger than the son's; besides, the son used to put at the bottom of his pictures, David Teniers, junior.

Teniers (Abraham), another son of David the elder, was equal, if not superior, to his father and brother in the expression of his characters, and his understanding the *claro obscuro*; though he was inferior in the sprightliness of his touch, and the lightness of his pencil.

TENNESSEE, one of the United States of America, situated between the parallels of 35 and 36½ degrees latitude; bounded on the S.

by Georgia, W. by the Mississippi, N. by Kentucky and Virginia, and E. by the Iron and Bald mountains, which separate it from N. Carolina. It is 400 miles in length and 104 in breadth; and divided into three districts, Washington, Mero, and Hamilton, which are subdivided into 14 counties. The principal rivers are the Mississippi, Tennessee, Cumberland, and Holston; and it is watered by other rivers and creeks. The Cumberland mountains, a lofty ridge near 30 miles broad, cut this state into the eastern and western divisions, which were originally known by the names of the establishments of Holston and Cumberland; but the latter is much the largest part. The climate, soil, and produce of Tennessee are nearly the same as the adjoining state of Kentucky; but W. Tennessee, or Cumberland, is less salubrious, having a warmer and more humid temperature. Knoxville is the capital.

Tennessee, a river of the United States, formerly called the Cherokee river, and the largest of all those which flow into the Ohio. Its commencement is formed in the state to which it gives name, by the junction of the Clinch with the Holston, 35 miles below Knoxville. It flows S.W. on the E. side of Cumberland mountains, into Georgia, where it make a circuit to the W. called the Great Bend; it then re-enters the state of Tennessee, which it passes quite through into that of Kentucky, where it enters the Ohio, 50 miles above the conflux of that river with the Mississippi. The Tennessee is 600 yards broad at its mouth, and thence navigable by vessels of great burden for 260 miles, to the Muscle Shoals, in the Great Bend: here the river widens to between two and three miles, for nearly 30 miles; and these shoals can only be passed in small boats: hence it may be navigated, by boats of 40 tons burden, 400 miles further to its commencement.

TENNIS, a play at which a ball is driven by a racket, which requires great practice to make a good player, so that nothing can be done without it; all we presume to do is, to give an insight into the game, by which a person may not seem a total stranger to it when he happens to be in a tennis-court.

The game of tennis is played in most capital cities in Europe, particularly in France, whence we may venture to derive its origin. It is esteemed, with many, to be one of the most ancient games in Christendom, and long before king Charles I.'s time it was played in England. This game is as intricate as any game whatever; a person who is totally ignorant of it may look on for a month together, without being able to make out how the game is decided.

The size of a tennis-court is generally about 96 or 97 feet by 33 or 34, there being no exact dimension ascribed to its proportion, a foot more or less in length or width being of no consequence. A line or net hangs exactly across the middle, over which the ball must be struck, either with a racket or board, to make the stroke good. Upon the entrance of a tennis-court, there is a long gallery which goes to the dedans, that is, a kind of front gallery, where spectators usually stand; into which whenever a ball is struck, it tells for a certain stroke. This long gallery is divided into different compartments or galleries; each of which has its particular name, as follows: from the line towards the dedans are the first gallery door, second gallery, and the last gallery, which is called the service side. From the dedans to the last gallery are the figures 1, 2, 3, 4, 5, 6, at a yard distance each, by which the chaces are marked, and is one of the most essential parts of the game, as will appear in the following description.

On the other side of the line are also the first gallery, door, second gallery, and last gallery, which is called the hazard side. Every ball struck into the last gallery on this side reckons for a certain stroke, the same as the dedans. Between the second and this last gallery are the figures 1, 2, to mark the chaces on the hazard-side. Over this long gallery, or these compartments, is a covering, called the penthouse, on which they play the ball from the service-side, in order to begin a set of tennis, from which it is called a service. When they miss putting the ball (so as to rebound from the penthouse) over a certain line on the service-side, it is deemed a fault, two of which are reckoned for a stroke. If the ball rolls round the penthouse, on the opposite of the court, so as to fall beyond a certain line described for that purpose, it is called passe, reckons for nothing on either side, and the player must serve again.

On the right hand side of the court from the dedans is what they call the tambour, a part of the wall which projects, and is so contrived in order to make a variety in the stroke, and render it more difficult to be returned by the adversary; for when a ball strikes the tambour, it varies its direction, and requires some extraordinary judgment to return it over the line. The last thing on the right-hand side is called the grill, wherein if the ball is struck, it is also 15, or a certain stroke.

The game of tennis is played by what they call sets; a set of tennis consists of six games: but if they play what is called an advantage-set, two above five games must be won on one side or the other successively, in order to decide; or, if it comes to six games all, two games must still be won on one side to conclude the set; so that an advantage-set may last a considerable time; for which kind of sets the court is paid more than for any other.

We must now describe the use of the chaces, and by what means these chaces decide or interfere so much in the game. When the player gives his service at the beginning of a set, his adversary is supposed to return the ball; and wherever it falls after the first rebound untouched, the chace is called accordingly; for example, if the ball falls at the figure 1, the chace is called at a yard, that is to say, at a yard from the dedans: this chace remains till a second service is given; and if the player on the service-side lets the ball go after his adversary returns it, and if the ball falls on or between any of these figures or chaces, they must change sides, there being two chaces; and he who then will be on the hazard-side, must play to win the first chace; which if he wins by striking the ball so as to fall, after its first rebound, nearer to the dedans than the figure 1, without his adversary's being able to return it from its first hop, he wins a stroke, and then proceeds in like manner to win the second chace, wherever it should happen to be. If a ball falls on the line with the first gallery door, second gallery, or last gallery, the chace is likewise called at such or such a place, naming the gallery door, &c. When it is just put over the line, it is called a chace at the line. If the player on the service-side returns a ball with such force as to strike the wall on the hazard-side so as to rebound, after the first hop over the line, it is also called a chase at the line.

The chaces on the hazard-side proceed from the ball being returned either too hard or not quite hard enough; so that the ball after its first rebound falls on this side of the blue line, or line which describes the hazard-side chaces; in which case it is a chace at 1, 2, &c. provided there is no chace depending. When they change sides, the player, in order to win this chace, must put the ball over the line any where, so that his adversary does not return it. When there is no chace on the hazard-side, all balls put over the line from the service-side, without being returned, reckon for a stroke.

As the game depends chiefly upon the marking, it will be necessary to explain it, and to recommend those who play at tennis to have a good and unbiassed marker, for on him the whole set may depend: he can mark in favour of the one and against the other in such a manner, as will render it two to one at starting, though even players. Instead of which the marker should be very attentive to the chaces, and not be any way partial to either of the players.

This game is marked in a very singular manner, which makes it at first somewhat difficult to understand. The first stroke is called 15, the second 30, the third 40, and the fourth game, unless the players get four strokes each; in that case, instead of calling it 40 all, it is called deuce; after which, as soon as any stroke is got, it is called advantage; and in case the strokes become equal again, deuce again, till one or the other gets two strokes following, which win the game; and as the games are won, so they are marked and called; as one game love, two games to one, &c. towards the set, of which so many of these games it consists.

Although but one ball at a time is played with, a number of balls are made use of at this game to avoid trouble, and are handed to the players in baskets for that purpose; by which means they can play as long as they please, without ever having occasion to stoop for a ball.

To Te'nnis. *v. a.* (from the noun.) To drive as a ball: not used (*Spenser*).

TENON, in building, &c. the end of a piece of wood, or metal, diminished by one third of its thickness, to be received into a hole in another piece, called a mortise, for the jointing or fastening the two together. It is made in various forms, square, dove-tailed for double mortises, and the like.

TENOR, or Tenore, in music, the first mean, or middle part, or that which is the ordinary pitch of the voice, when neither raised to a treble, or lowered to a bass. The tenor is commonly marked in thorough bass with the letter T. This is that part which almost all grown persons can sing; but as some have a greater compass of voice upwards, others downwards, others are confined to a kind of medium, and others can go equally high or low; hence musicians make a variety of tenors, as a low, a high, a mean, a natural tenor, to which may be added, a violin tenor, &c. for instruments. See Music.

Tenor-cliff, the name given to the C cliff when placed on the fourth line of the stave. See Cliff.

Tenor violin, or Viola, a stringed instrument resembling the violin, but lower in its scale, having its lowest note in C above G gamut. In concert this instrument takes the part next above the bass.

TE'NOUR. *s.* (*tenor*, Lat. *teneur*, Fr.) 1. Continuity of state; constant mode; manner of continuity (*Sprat*). 2. Sense contained; general course or drift.

TENSE. *a.* (*tensus*, Lat.) Stretched; stiff; not lax (*Holder*).

Tense, time, in grammar, an inflection of verbs, whereby they are made to signify or distinguish the circumstance of time, in what they affirm. See Grammar.

TE'NSENESS. *s.* (from *tense.*) Contraction; tension: the contrary to *laxity* (*Sharp*).

TE'NSIBLE. *a.* (*tensus*, Lat.) Capable of being extended (*Bacon*).

TE'NSILE. *a.* (*tensilis*, Lat.) Capable of extension (*Bacon*).

TE'NSION. *s.* (*tension*, Fr. *tensus*, Lat.) 1. The act of stretching (*Holder*). 2. The state of being stretched (*Blackmore*).

TE'NSIVE. *a.* (*tensus*, Latin.) Giving a sensation of stiffness or contraction (*Floyer*).

TENSOR PALATI, in anatomy. See Circumflexus.

Tensor tympani. A muscle of the ear, which pulls the malleus and the membrane of the tympanum towards the petrous portion of the temporal bone, by which the membrana tympani is made more concave and tense.

Tensor vaginæ femoris. Fascialis. Musculus membranosus. Musculus aponeurosis, vel, fasciæ latæ of Winslow. A muscle situated on the outside of the thigh, which stretches the membranous fascia of the thigh, assists in the abduction of the thigh, and somewhat in its rotation inwards. It arises by a narrow, tendinous, and fleshy beginning from the external part of the anterior, superior, spinous process of the ilium, and is inserted a little below the great trochanter into the membranous fascia.

TENT, in war, a pavilion or portable house. Tents are made of canvas, for officers and soldiers to lie under when in the field. The size of the officers' tents is not fixed; some regiments have them of one size and some of another; a captain's tent and marquee is generally 10½ feet broad, 14 deep, and 8 high; the subalterns' are a foot less; the major's and lieutenant-colonel's a foot larger; and the colonel's two feet larger. The subalterns of foot lie two in a tent, and those of horse but one. The tents of private men are 6½ feet square, and 5 feet high, and hold 5 soldiers each. The tents for horse are 7 feet broad and 9 feet deep: they hold likewise five men and their horse accoutrements.—The word is formed from the Latin *tentorium*, of *tendo*, I stretch, because tents are usually made of canvas stretched out, and sustained by poles, with cords and pegs.

TENT, a kind of plug of lint, or tow, rolled up in the form of a solid wedge, for the purpose of being thrust into a small aperture in a sore; with a view either to dilate it gradually, or to prevent its closing prematurely. For dilatation, bits of sponge are used dipped into a melted composition of rosin, wax, and oil, in proper proportions, and strongly pressed between two iron plates, so as, when cooled, to retain their compressed form.

TENT, signifies also, by application, any temporary habitation; a pavilion.

TENT, is likewise the name of a kind of red wine, chiefly from Gallicia, in Spain.

To TENT. *v. n.* (from the noun.) To lodge as in a tent; to tabernacle (*Shakspeare*).

To TENT. *v. a.* To search as with a medical tent (*Wiseman*).

TENTACULA. TENTACLES. The feelers of insects and worms.

TENTA'TION. *s.* (*tentation*, Fr. *tentatio*, Lat.) Trial; temptation (*Brown*).

TE'NTATIVE. *a.* (*tentative*, Fr. *tento*, Lat.) Trying; essaying (*Bentley*).

TEN-TCHEOU, a city of China, of the first rank, in Chang-tong, with a good port, and a strong garrison. It is seated on the N. side of a peninsula of the Yellow sea, 250 miles S.E. of Peking. Lon. 120. 50 E. Lat. 37. 20 N.

TE'NTED. *a.* (from *tent.*) Covered with tents (*Pope*).

TE'NTER. *s.* (*tendo*, *tentus*, Lat.) 1. A hook on which things are stretched. 2. *To be on the* TENTERS. To be on the stretch; to be in difficulties (*Hudibras*).

To TE'NTER. *v. a.* (from the noun.) To stretch by hooks (*Bacon*).

To TE'NTER. *v. n.* To admit extension (*Bacon*).

TENTER, a railing used in the cloth-manufacture, to stretch out the pieces of cloth, stuff, &c. or only to make them even, and set them square. It is usually about four feet and a half high, and for length exceeds that of the longest piece of cloth. It consists of several long pieces of wood, placed so that the lower cross-pieces of wood may be raised or lowered, as is found requisite, to be fixed at any height, by means of pins. Along the cross-pieces, both the upper and under one, are hooked nails, called tenter-hooks, driven in from space to space.

TENTERDEN, a town in Kent, governed by a mayor, with a market on Friday. The steeple of the church is very lofty, and at the time of the Spanish invasion, in 1588, was made use of as a beacon. It is 24 miles S.W. of Canterbury, and 56 E. by S. of London.

TENTH. *a.* (teoða, Saxon.) First after the ninth; ordinal of ten.

TENTH. *s.* (from the adjective.) 1. The tenth part (*Locke*). 2. Tithe (*Philips*). 3. *Tenths* are that yearly portion which all livings ecclesiastical yield to the king (*Cowell*).

TE'NTHLY. *ad.* In the tenth place.

TENTHREDO. Saw-fly. In zoology, a genus of the class insecta, order hymenoptera. Mouth with a horny curved mandible, toothed within, the jaw straight and obtuse at the tip, the lip cylindrical, bifid; feelers four, unequal, filiform; wings tumid, the lower ones less; sting composed of two serrate laminæ, and scarcely visible; stemmata three. A hundred and fifty-three species; three or four natives of America, the rest of Europe; thirty-eight, inhabitants of our own country.

The insects of this tribe feed on the leaves of various plants: the female uses her sting in the manner of a saw, and cuts out spaces in the twigs or buds of trees for the purpose of depositing her eggs. Larve cylindrical, soft; from sixteen to twenty-eight footed; feeds on the leaves of plants, and, when touched, rolls itself up spirally. Pupe foliculate. The eggs increase in size every day till the larves burst from them.

The tribe is thus divided into sections.

A. Antennas clavate.

B. Antennas inarticulate, thicker at the tip.

C. Antennas pectinate.

D. Antennas filiform, with from seven to nine articulations. This is by far the most numerous section.

E. Antennas filiform, with numerous articulations.

The tenthredo femorata is, as the name imports, burdened with two large thighs; the whole insect is black, except the antennas and tarsi of the feet, which are yellow.

The tenthredo luctuosa alni. This quiet, melancholy, and beautiful fly is found among alder plantations, and is often fatally entangled in the clammy juice that issues from their leaves. The head and trunk are of a fine yellowish brown; the antennas a more dusky shade of the same colour, and the eyes blue:

the body coal black; the segments of a brownish yellow; the wings are of a pale yellowish brown, with little yellow risings upon their fibres, and a margin of yellow. See Nat. Hist. Pl. CLXXXI.

TENTI'GINOUS. *a.* (*tentigo*, Lat.) Stiff; stretched.

TENTORIUM. A process of the dura mater, separating the cerebrum from the cerebellum. It extends from the internal horizontal spine of the occipital bone, directly forwards to the sella turcica of the sphænoid bone.

TENUIFO'LIOUS. *a.* (*tenuis* and *folium*, Lat.) Having thin leaves.

TENU'ITY. *s.* (*tenuitas*, Latin.) 1. Thinness; exility; smallness; minuteness; not grossness (*Bentley*). 2. Poverty; meanness: not used (*King Charles*).

TE'NUOUS. *a.* (*tenuis*, Lat.) Thin; small; minute (*Brown*).

TENURE, in law, signifies the manner whereby lands or tenements are held, or the service that the tenant owes to his lord. Of this kingdom almost all the real property is by the policy of our laws supposed to be granted by, dependent upon, and holden of, some superior lord, by and in consideration of certain services to be rendered to the lord by the tenant or possessor of this property. The thing holden is therefore styled a tenement, the possessors thereof tenants, and the manner of their possession a tenure. Thus all the land of the kingdom is supposed to be holden, mediately or immediately, of the king; who is styled the lord paramount, or above all. Such tenants as held under the king immediately, when they granted out portions of the lands to inferior persons, became also lords with respect to those inferior persons, as they were still tenants with respect to the king; and, thus partaking of a middle nature, were called mesne or middle lords. So that if the king granted a manor to A, and he granted a portion of the land to B, now B was said to hold of A, and A of the king; or, in other words, B held his lands immediately of A, but mediately of the king. The king therefore was styled lord paramount: A was both tenant and lord, or was a mesne lord; and B was called tenant paravail, or the lowest tenant, being he who was supposed to make avail, or profit of the land. In this manner are all the lands of the kingdom holden which are in the hands of subjects: for, according to sir Edward Coke, in the law of England we have not properly *allodium*, which is the name by which the feudists abroad distinguish such estates of the subject as are not holden of any superior. So that at the first glance we may observe, that our lands are either plainly feuds, or partake very strongly of the feodal nature.

All tenures being thus derived, or supposed to be derived, from the king, those that held immediately under him, in right of his crown and dignity, were called his tenants *in capite*, or in chief; which was the most honourable species of tenure, but at the same time subjected the tenants to greater and more burthensome services than inferior tenures did. And this distinction ran through all the different sorts of tenure.

There seem to have subsisted among our ancestors four principal species of lay tenures, to which all other may be reduced: the grand criteria of which were the natures of the several services or renders that were due to the lords from their tenants. The services, in respect of their quality, were either free or base services: in respect of their quantity and the time of exacting them were either certain or uncertain. Free services were such as were not unbecoming the character of a soldier or a freeman to perform; as to serve under his lord in the wars, to pay a sum of money, and the like. Base services were such as were fit only for peasants or persons of a servile rank; as to plough the lord's land, to make his hedges, to carry out his dung, or other mean employments. The certain services, whether free or base, were such as were stinted in quantity, and could not be exceeded on any pretence; as, to pay a stated annual rent, or to plough such a field for three days. The uncertain depended upon unknown contingencies; as, to do military service in person, or pay an assessment in lieu of it when called upon; or to wind a horn upon the appearance of invaders; which are free services; or to do whatever the lord should command; which is a base or villein service.

From the various combinations of these services have arisen the four kinds of lay-tenure which subsisted in England till the middle of the last century; and three of which subsist to this day. Of these Bracton (who wrote under Henry III.) seems to give the clearest and most compendious account of any author ancient or modern; of which the following is the outline or abstract: "Tenements are of two kinds, frank-tenement, and villenage. And of frank-tenements, some are held freely in consideration of homage and knight-service; others in free-socage, with the service of fealty only. And again, of villenages, some are pure, and others privileged. He that holds in pure villenage shall do whatsoever is commanded him, and always be bound to an uncertain service. The other kind of villenage is called villein socage; and these villein-socmen do villein services, but such as are certain and determined." Of which the sense seems to be as follows; first, where the service was free, but uncertain, as military service with homage, that tenure was called the tenure in chivalry, *per servitium militare*, or by knight service. Secondly, where the service was not only free, but also certain, as by fealty only, by rent and fealty, &c. that tenure was called *liberum socagium*, or free socage. These were the only free holdings or tenements; the others were villenous or servile: as, thirdly, where the service was base in its nature, and uncertain as to time and quantity, the tenure was *purum ville-*

nagium, absolute or pure villenage. Lastly, where the service was base in its nature, but reduced to a certainty, this was still villenage, but distinguished from the other by the name of privileged villenage, *villenagium privilegiatum*; or it might be still called socage (from the certainty of its services), but degraded by their baseness into the inferior title of *villanum socagium*, villein-socage.

TENXIS. (τεγξις, from τεγlω, to moisten.) Humectation.

TEOS, or Teios, a maritime town on the coast of Ionia in Asia Minor, opposite Samos. It was one of the twelve cities of the Ionian confederacy, and gave birth to Anacreon and Hecatæus. According to Pliny, Teos was an island. Augustus repaired Teos, whence he is often called the founder of it in ancient medals.

TEPEFA'CTION. *s.* (*tepefacio*, Lat.) The act of warming to a small degree.

TE'PID. *a.* (*tepidus*, Latin.) Lukewarm; warm in a small degree (*Milton*).

TEPI'DITY. *s.* (from *tepid*.) Lukewarmness.

TE'POR. *s.* (*tepor*, Lat.) Lukewarmness; gentle heat (*Arbuthnot*).

TERAPHIM, or Theraphim, a word in the Hebrew language, which has exercised much the ingenuity of the critics. It occurs thirteen or fourteen times in the Old Testament, and is commonly interpreted idols. We will not trouble our readers with the numerous conjectures which have been formed respecting the meaning of this word.

TERASSO, a seaport of Asiatic Turkey, in Caramania, and an archbishop's see. It was formerly called Tarsus, was the capital of Cilicia, and is the birthplace of St. Paul. It is seated on the Mediterranean, 100 miles W. by N. of Alexandretta. Lon. 35. 15 E. Lat. 37. 4 N.

TERATO'LOGY. *s.* (τερατος and λεγο.) Bombast; affectation of false sublimity.

TERCE. *s.* (*tierce*, Fr.) A vessel containing forty-two gallons of wine; the third part of a butt or pipe (*Ainsworth*).

TERCERA, one of the Azores, of a circular form, about 55 miles in circumference, and very fertile. It contains several towns and villages, with a number of forts. Angra is the capital.

TERCHIZ, or Tershiz, a town of Persia, in the province of Chorasan, 120 miles W.N.W. of Herat. Lon. 57. 25 E. Lat. 35. 5 N.

TEREBELLA, in zoology, a genus of the class vermes, order mollusca. Belly oblong, creeping, naked, often inclosed in a tube, furnished with lateral fascicles or tufts, and branchiæ; mouth placed before, furnished with lips, without teeth, and protruding a clavate proboscis: feelers numerous, ciliate, capillary, seated round the mouth. Eleven species, scattered through the seas of the globe. The following are chiefly entitled to notice.

1. T. complanata. Ship-worm. Body depressed, with four cirrhi round the mouth, and a double row of lateral pencilled protuberances on each side. Inhabits the seas round the West India islands, and is extremely destructive to vessels lying at anchor; it cuts with great facility through the stoutest plank, and burrows into the substance, incrusting the sides of the hole with a smooth testaceous coat; with equal ease and expedition it destroys piles, and the timber of wharfs. The teredo navalis appears to be little more than this animal with a testaceous involucrum.

2. T. conchilega. Body whitish, with numerous, filiform cirrhi round the mouth, the upper ones very long; branchiæ deep red. Inhabits the British coasts within the shell of the sabella tubiformis, and the only species found on our shores; about five inches long, pellucid, and tapering towards the lower end: the tube taper, straight, composed of minute particles of sand, about the size of a goose-quill, and nearly half a foot long.

3. T. carunculata. Body depressed, quadrangular, with four rows of pencilled fascicles, those on the belly without cirrhi. Inhabits the American and Indian seas, and like terebella complanata, very destructive to wharfs and shipping; from nine to fourteen inches long.

4. T. bicornis. Proboscis with a simple, terminal, two-horned disk. Inhabits the American ocean, and perforates into some of the globose madrepores, where it resides, and occasionally protrudes itself in search of food.

TEREBINTHINA ARGENTAROTENSIS. Strasburg turpentine. This species is generally more transparent and less tenacious than either the Venice or Chio turpentines. It is of a yellowish brown colour, and of a more agreeable smell than any of the turpentines, except the Chio. It is extracted in several parts of Germany, from the red and silver fir, by cutting out, successively, narrow strips of the bark. In some places a resinous juice is collected from under the bark called cuchrym abregna, and oleum abietinum. See Tunpentine.

Terebinthina chia. See Chio turpentine.

Terebinthina communis. See Terebinthina vulgaris.

Terebinthina cypria. See Chio turpentine.

Terebinthina veneta. Venice turpentine; so called because we are supplied with it from the Venetians. This species of turpentine issues spontaneously through the bark of the pinus larix; foliis fasciculatis mollibus obtusiusculis bracteis extra squamas strobilorum extantibus. Hort. Kew. C. O. Monoecia, monadelphia. It is usually thinner than any of the other sorts; of a clear whitish or pale yellowish colour; a hot, pungent, bitterish, disagreeable taste; and a strong smell, without any thing of the aromatic flavour of the chian kind. For its virtues, see Turpentine.

Terebinthina vulgaris. Common turpentines. This species of turpentine flows very freely from the pinus picea of Linnéus. Pinus foliis solitariis plenis emarginatis pectinatis, squamis coni obtusissimis adpressis. Hort. Kew. C. O. Monoecia, monadelphia. For its medicinal uses, see TURPENTINE.

TEREBI'NTHINATE. TEREBI'NTHINE. *a.* (*terebinthine*, Fr. *terebinthum*, Lat.) Consisting of turpentine; mixed with turpentine.

To TE'REBRATE. *v. a.* (*terebro*, Lat.) To bore; to perforate; to pierce (*Derham*).

TEREBRA'TION. *s.* (from *terebrate.*) The act of boring or piercing (*Bacon*).

TEREDO, in zoology, a genus of the class vermes, order testacea. Animal a terebella, with two calcareous hemispheric valves cut off before and two lanceolate ones; shell tapering, flexuous, and capable of penetrating wood. Four species, as follow:

1. T. navalis. Ship-worm. Shell very thin, cylindrical, smooth; more or less twisted, rather obtuse at the tip; from four to six inches long. Found in the sides and bottoms of ships, and the stoutest oak pales, which has remained some time under water, and has been transported from India. It acts to the same effect as the terebella complanata, but with still greater power.

The head of this creature is well prepared for this office, being coated with a strong armour, and furnished with a mouth like that of the leech, by which it pierces wood as the leech does the skin: the neck is provided also with muscles of great strength. It is very minute when it first issues from the egg; but grows to the length of upwards of six inches. This tribe generally act gregariously, and take especial care not to interfere with each other's cells or habitations; externally, the opening is scarcely visible; but where they have committed their depredations, or taken off a layer of plank, the whole interior exhibits a honeycomb appearance, and is generally entirely destroyed. In some sense this tribe may be said to co-operate at sea with the labours of the termes fatale or white-ant on land; and while it commits enormous mischief on the labours of the shipwright, it effectually removes those obstructions in rivers and in many parts of the ocean itself which would otherwise ensue from such immense quantities of trees as are often washed down by rapid torrents from the mountains, and would otherwise remain in a state of perfect preservation under water for centuries.

2. T. utriculus. Shell solid, cylindric, undulate. Habitation doubtful: about seven inches long.

3. T. clava. Shell clavate at one end, the other incurved, narrower, obtuse, and perforated in the middle. Found in the seed-vessels of the xylosteum granatum; near two inches long, less than half an inch broad; shell rough, brownish on the outside, within smooth, more or less flexuous.

4. T. gigantea. Shell solid, cylindric, tapering. From five to five feet and a half long. Found not in wood, but in a mud-bank raised by a violent earthquake in 1797 in an island north-west of Sumatra. We have added this species from a particular account given of it in the Philosophical Transactions for 1806, Part i. art. 12 and 13.

TERENCE, or TERENTIUS PUBLIUS, a native of Africa, celebrated for the comedies he wrote. He was sold as a slave to Terentius Lucanus, a Roman senator, who educated him with great care, and manumitted him for the brilliancy of his genius. He bore the name of his master and benefactor, and was called Terentius. He applied himself to the study of Greek comedy with uncommon assiduity, and merited the friendship and patronage of the learned and powerful. Scipio, the elder Africanus, and his friend Lælius, have been suspected, on account of their intimacy, of assisting the poet in the composition of his comedies; and the fine language, the pure expressions, and delicate sentiments with which the plays of Terence abound, seem perhaps to favour the supposition. Terence was in the 25th year of his age when his first play appeared on the Roman stage. All his compositions were received with great applause; but when the words

Homo sum, humani nil a me alienum puto,

were repeated, the plaudits were reiterated, and the audience, though composed of foreigners, conquered nations, allies, and citizens of Rome, were unanimous in applauding the poet, who spoke with such elegance and simplicity the language of nature, and supported the native independence of man. The talents of Terence were employed rather in translating than in search of originality. It is said that he translated 108 of the comedies of the poet Menander, six of which only are extant. Quintilian, who candidly acknowledges the deficiencies of the Roman comedy, declares that Terence was the most elegant and refined of all the comedians whose writings appeared on the stage. The time and the manner of his death are unknown. He left Rome in the 35th year of his age, and never after appeared there. Some suppose that he was drowned in a storm as he returned from Greece, about 159 years before Christ.

There are six of Terence's comedies extant. The editio princeps of this author bears date 1470. The Aldine, Elzevir, and Stephens's editions are valuable. But the editions of Long, published in 4to. at Cambridge 1704, —of Hugenius, published in 8vo. at Amsterdam, 1710,—of Bentley, 4to. Amsterdam, 1727,—of Westerhovius, 2 vols. 4to. 1726,—of Zeunius, 2 vols. 8vo. Leipsic, 1774,—and of Decker, 4to. Basil, 1797, are the mostly deservedly esteemed. Madam Dacier has given a beautiful French version of this author; and a very good English translation was published in 4to. 1768, by Mr. Colman.

TERES MAJOR. (*musculus major. Teres* round, smooth.) This muscle, which is longer and thicker than the teres minor, is situated along the inferior costa of the scapula, and is in part covered by the deltoides.

It arises fleshy from the outer surface of the inferior angle of the scapula, (where it covers some part of the infra-spinatus and teres minor, with both which its fibres intermix), and likewise from the lower and posterior half of the inferior costa of the scapula. Ascending obliquely towards the os humeri, it passes under the long head of the triceps brachii, and then becomes thinner and flatter to form a thin tendon of about an inch in breadth, and somewhat more in length, which runs immediately behind that of the latissimus dorsi, and is inserted along with it into the ridge at the inner side of the groove that lodges the long head of the biceps. These two tendons are included in a common capsula, besides which the tendon of this muscle adheres to the os humeri, by two other capsulæ which we find placed one above the other.

This muscle assists in the rotatory motion of the arm, and likewise in drawing it downwards and backwards; so that we may consider it as the congener of the latissimus dorsi.

Teres minor. This muscle seems to have been first described by Fallopius. Riolanus, who was the first that distinguished this and the other muscles of the scapula by particular appellations, gave the name of teres to this and the following muscle, on account of their long and round shape. The teres minor is a thin fleshy muscle, situated along the inferior edge of the infra-spinatus, and is in part covered by the posterior part of the deltoides.

It arises fleshy from all the convex edge of the inferior costa of the scapula; from thence it ascends obliquely upwards and forwards, and terminates in a flat tendon, which adheres to the lower and posterior part of the capsular ligament of the joint, and is inserted into the lower part of the great tuberosity of the os humeri, a little below the termination of the infra-spinatus.

The tendinous membrane, which is continued from the infra-spinatus, and spread over the teres minor, likewise forms a thin septum between the two muscles. In some subjects, however, they are so closely united, as to be with difficulty separated from each other. Some of the fibres of the teres minor are intermixed with those of the teres major and subscapularis.

The uses of this muscle are similar to those of the infra-spinatus.

TERGEMINATE LEAF. (*folium tergeminatum.*) In botany, a thrice-double leaf. Petiolus bifidus utroque apice foliola duo et insuper foliola duo ad divaricationem petiola communis.—When a forked petiole is subdivided, having two leaflets at the extremity of each subdivision; and also two other leaflets at the division of the common petiole. The explanation, however, given above from Delin. Pl. does not express as much; because it is a species of the super-decompound leaf, the essence of which consists in its dividing thrice at least.

TERGE'MINOUS. *a.* (*tergiminus,* Latin.) Threefold.

TERGIVERSA'TION. *s.* (*tergum* and *verso,* Latin.) 1. Shift; subterfuge; evasion (*Bramhall*). 2. Change; fickleness (*Clarendon*).

TERGOVIST, or Tervis, a town of European Turkey, in Walachia. Here is a fine palace, belonging to the hospodar, or reigning prince; but he chiefly resides at Buchorest. It is seated on the Jalonitz, 35 miles N.N.W. of Buchorest. Lon. 25. 48 E. Lat. 45. 28 N.

TERKI, a town of Carcassia, where a prince resides dependent on Russia, this being a frontier place against Persia. It is seated on a river of the same name, near the Caspian sea, 180 miles S. of Astracan. Lon. 47. 30 E. Lat. 43. 22 N.

TERM. (*terminus.*) 1. Limit; boundary. 2. (*terme,* Fr.) The word by which a thing is expressed (*Swift*). 3. Words; language (*Milton*). 4. Condition; stipulation (*Dryd.*). 5. (*termine,* old Fr.) Time for which any thing lasts; a limited time (*Addison*).

Term, in geometry, is the extreme of any magnitude, or that which bounds and limits its extent. To the terms of a line, are points; of a superficies, lines; of a solid, superficies.

Terms, of an equation, or of any quantity, in algebra, are the several names or members of which it is composed, separated from one another by the signs + or —. So, the quantity $ax + 2bc - 3ax^2$, consists of the three terms ax and $2bc$ and $3ax^2$.

In an equation, the terms are the parts which contain the several powers of the same unknown letter or quantity: for if the same unknown quantity be found in several members in the same degree or power, they shall pass but for one term, which is called a compound one, in distinction from a simple or single term. Thus, in the equation $x^3 + (a-3b)x^2 - acx = b^3$, the four terms are x^3 and $(a-3b)\ x^2$ and acx and b^3; of which the second term $(a-3b)\ x^2$ is compound, and the other three are simple terms.

Terms are also used for the several times or seasons of the year in which the public colleges or universities, or courts of law, are open, or sit. Such are the Oxford and Cambridge terms; also the terms for the courts of King's-Bench, Common Pleas, and the Exchequer, which are the high courts of common law. But the high court of parliament, the chancery, and inferior courts, do not observe the terms.—The rest of the year, out of term-time, is called vacation.

There are four law terms in the year; viz.

Hilary-term, which, at London, begins the 23d day of January, and ends the 12th of February.

Easter-term, which begins the 3d Wednesday after Easter-day, and ends on the Monday next after Ascension-day.

Trinity-term, which begins the Friday next after Trinity-Sunday, and ends the 4th Wednesday after Trinity-Sunday.

Michaelmas-term, which begins the 6th of November, and ends the 28th of November.

All these terms have also their returns, the days of which are expressed in the following synopsis.

HILARY-TERM

Begins - January 23,
1st Return - January 20,
2d ——— - January 27,
3d ——— - February 3,
4th ——— - February 9,
Ends - - - February 12.

EASTER-TERM

Begins - - 3 Wed. after Easter,
1st Return - 2 Wks. after Easter,
2d ——— - 3 Wks. after Easter,
3d ——— - 4 Wks. after Easter,
4th ——— - 5 Wks. after Easter,
5th ——— - Ascension day,
Ends - - - Monday after Ascension.

TRINITY-TERM

Begins - Frid. after Trin. Sund.
1st Return - Trinity Monday,
2d ——— - 1 Wk. after Trinity,
3d ——— - 2 Wks. after Trinity,
4th ——— - 3 Wks. after Trinity,
Ends - - - 4th Wed. af. Trin. Sun.

MICHAELMAS-TERM

Begins - November 6,
1st Return - November 3,
2d ——— - November 12,
3d ——— - November 18,
4th ——— - November 25,
Ends - - - November 28.

N. B.—When the beginning or ending of any of these terms happens on a Sunday, it is held on the Monday after.

Oxford-terms.—These are four; which begin and end as below:

LENT-TERM

Begins - January 14,
Ends - Saturday before Palm-Sunday.

EASTER-TERM

Begins - Wed. after Low-Sunday,
Ends - Thursday before Whitsunday.

TRINITY-TERM

Begins - Wed. after Trinity-Sunday,
Ends - Saturday after the Act.

MICHAELMAS-TERM

Begins - October 10,
Ends - December 16.

N. B.—The Act is 1st Monday after the 6th of July.—When the day of the beginning or ending happens on a Sunday, the terms begin or end the day after.

Cambridge-terms.—These are three, as below:

LENT-TERM

Begins - January 13,
Ends - Friday before Palm-Sunday.

EASTER-TERM

Begins - Wed. after Low-Sunday,
Ends - Friday after Commencement,

MICHAELMAS-TERM

Begins - October 10,
Ends - December 16.

N. B.—The commencement is the 1st Tuesday in July.—There is no difference on account of the beginning or ending being Sunday.

TERMS (Scottish). The court of session has two terms, the winter and summer. The winter begins on 12th November, and ends 11th March, only there is a recess of three weeks at Christmas. The summer-term commences 12th May, and ends 11th July. The court of exchequer has four terms: 1. Candlemas-term begins 15th January, and ends 3d February; 2. Whitsuntide-term begins 12th May, and ends 2d June; 3. Lammas-term begins 17th June, and ends 5th July; 4. Martinmas-term begins 24th November, and ends 20th December.

TERMS (Irish). In Ireland the terms are the same as at London, except Michaelmas-term, which begins October the 13th, and adjourns to November the 3d, and thence to the 6th.

TERMS, TERMES, TERMINI, in architecture, denote a kind of statues, or columns, adorned at top with the figure of a man's, woman's, or satyr's head, as a capital; and the lower part ending in a kind of sheath, or scabbard.

TERMS (Miliary), *termini miliares*, among the ancient Greeks, were the heads of certain divinities, placed on square land-marks of stone, or on a kind of sheath, to mark the several stadia, &c. in the roads. These are what Plautus calls *lares viales*.

To TERM. *v. a.* (from the noun.) To name; to call (*Locke*).

TE'RMAGANCY. *s.* (from *termagant*.) Turbulence; tumultuousness (*Parker*).

TE'RMAGANT. *a.* (ꞇẏꞃ and maȝan, Sax.) 1. Tumultuous; turbulent (*Shakspeare*). 2. Quarrelsome; scolding; furious (*Arbuthnot*).

TE'RMAGANT. *s.* A scold; a brawling turbulent woman (*Hudibras*).

TERMED, a town of Usbec Tartary, capital of a district in Bokharia; seated in an angle formed by the union of two rivers, 150 miles S. of Samarcand. Lon. 65. 35 E. Lat. 37. 15 N.

TERME'R. *s.* (from *term*.) One who travels up to the term (*Ben Jonson*).

TERMES, in zoology, a genus of the class insecta, order aptera. Mouth with two horny jaws; lip horny, four-cleft, the divisions linear and acute; feelers four, filiform, equal; eyes two. Ten species.

These insects might with equal propriety be arranged under the orders neuroptera or hymenoptera, most of them having two or four wings in the perfect state. The species are thus subdivided.

A. Antennas moniliform.

B. Antennas setaceous, constituting the tribe hemerobius of Fabricius.

We shall select a few examples.

The first three belong to the division A: the four last to the division B, and are the whole it contains.

1. T. fatale. White-ant. Body above brown: thorax with three segments; wings pale, with a testaceous rib. The animals of this extraordinary community, far exceeding in wisdom or policy the bee, the ant, or the beaver, are inhabitants of India, Africa, and South America. They build pyramidal structures ten or twelve feet in height, and divided into appropriate apartments, magazines for provisions, arched chambers, and galleries of communication. These are so firmly cemented that they easily bear four men to stand upon them, and in the plains of Senegal appear like the villages of the natives.

With such wonderful dexterity and rapidity do they destroy food, furniture, books, clothes, and timber, of whatever magnitude, leaving a mere thin surface, that in a few hours a large beam will be eaten to a mere shell not thicker than writing paper.

The only timber which they will not touch is the trunk of the tectonia grandis or teke-wood, which on this account is of very high value in India.

Larve small, about a quarter of an inch long, six-footed, pale, with a roundish testaceous head; eyeless; mandibles short, strong, and toothed; antennas as long as the thorax, and ovate abdomen. These only are the labourers who build the structures, procure provision for the males and females, and take care of the eggs; they are the most numerous.

Pupe, larger than the larve; about half an inch long, with a very large, ovate, polished, testaceous head; eyeless; mandibles projecting, as long as the head, forked, without teeth, sharp and black; thorax and abdomen palish.

These never work, but act as superintendants over the labourers, or as guards to defend their habitations from intrusion and violence. When a breach is made in the dwelling, they rush forward and defend the entrance with great ferocity; some of them beating with their mandibles against any hard substance, as a signal to the other guards, or as an encouragement to the labourers: they then retire, and are succeeded by the labourers, each with a burden of tempered mortar in his mouth, and who diligently set about to repair whatever injury has been sustained. One of these attends every six or eight hundred labourers who are building a wall, taking no active part himself, but frequently making the noise above-mentioned, which is constantly answered by a loud hiss from all the labourers, who at the same time evidently redouble their diligence.

The male and female are alike, and furnished with four long horizontal wings; head small, brown; mandibles short, acute, toothed; antennas yellowish; eyes globular, prominent, black; thorax with three brown or dull testaceous margined segments; abdomen ovate; the back brown, with white streaks; legs palish.

These are extricated from the pupe state and fly abroad in the night; but soon after sunrise the wings become dry, and they fall on the ground, and are devoured by birds or sought after by the inhabitants, who roast and eat them with great avidity. A few that survive are collected by the labourers or larves, and inclosed by pairs in apartments made of clay, the aperture of which is narrowed so that they cannot migrate, and where they are diligently fed and attended by the labourers, whose bodies are small enough to admit an easy entrance.

After impregnation the abdomen of the female grows to a prodigious bulk, exceeding the rest of her body nearly two thousand times; it is then vesicular and white, with transverse brown spots, and an undulate or slightly-lobed margin. In this state it contains an immense number of small, round, brown eggs, which are protruded to the amount of eight thousand in twenty-four hours. These are instantly taken up by the labourers, and conveyed to separate chambers; where, after they are hatched, the young are attended and provided for till they are able to shift for themselves, and take their share in the labours of the community.

2. T. destructor. Body above testaceous; head black; antennas yellow. Larve palish-brown; eyeless; head black, conic, tapering to a point. Inhabits America, India, and Africa; builds an ovate, thick nest, about the branches of trees; resembles the preceding in its manners, and is about half the size.

3. T. arda. Black; segments of the abdomen tipt with white; legs pale. Inhabits Sierra Leone; and resembles in its economy termes fatale: builds a cylindrical nest two or three feet high, of brown clay and vegetables mixed up together, with a round, vaulted dome, surrounded by a prominent terrace. Larve or labourer with a pale head; eyeless. Pupe, or guard, with a very large testaceous head, elevated, and gibbous before, and ovate, extended, obtuse behind. Perfect insect less than the former ones, with incumbent black wings and pale testaceous legs.

4. T. capense. Pale yellow; wings hyaline, edged with brown. Inhabits India and America; an indistinct species. Larve furnished with two black eyes, and wanders about in the daytime like the common ant.

5. T. pulsatorium. Tick-watch. Apterous; abdomen oblong; mouth red; eyes yellow. Inhabits Europe and America, and found in

our own country, in old wood, decayed furniture, museums, and neglected books; rarely found with wings. The female, to attract the male, beats like the ticking of a watch, and is often mistaken for the plinus pulsator, or death-watch.

6. T. fatidicum. Apterous; abdomen ovate; mouth pale; eyes brown. Inhabits Europe; resembles the last, but is a little larger.

7. T. divinatorium. Abdomen transversely furrowed; mouth brown; eyes black; body whitish. Found in books; and is extremely active. See Nat. Hist. Pl. CLXXXI.

TE'RMINABLE. *a.* (from *terminate.*) Limitable; that admits of bounds.

TERMINAL, in botany. Terminating or coming out at the end of a branch or stem. Applied to scape, peduncle, flower, spike, cyme, anther, awn, and thorn. Opposed to axillary.

Terminal velocity, in the theory of projectiles, is the greatest velocity which a ball can acquire by descending vertically, in air, and with which, when attained, it would continue to descend uniformly if no solid obstacle destroyed the motion. In iron balls the terminal velocity $v = 178\sqrt{d}$.

For the use of this in practical gunnery, see Hutton's Tracts, lately published, vol. iii. pp. 247—270, &c.

TERMINALIA, in antiquity, feasts celebrated by the Romans, in honour of the god Terminus.

Varro is of opinion, that this feast took its name from its being at the term or end of the year: but Festus is of a different sentiment, and derives it from the name of the deity in whose honour it was held.

In reality, the terminalia, or feasts of landmarks, were held in honour of Jupiter, considered in the capacity of conservator of landmarks or bounds. Dionysius Halicarnassus tells us, that it was Numa Pompilius who first consecrated land-marks to Jupiter; and adds, that the same prince appointed an anniversary day, wherein the country-people, assembling together on the bounds of the lands, should offer sacrifices in honour of the tutelary gods thereof. Some authors affirm that the terminalia were held in February; others that they occurred in May.

Terminalia, in botany, a genus of the class polygamia, order monœcia. Calyx five-parted, corolless; stamens ten. Herm.: style one; drupe inferior, boat-shaped. Six species; natives of the East or West Indies.

TERMINALIS, a sirname of Jupiter.

To TE'RMINATE. *v. a.* (*termino*, Latin; *terminer*, French.) 1. To bound; to limit (*Locke*). 2. To put an end to.

To Te'rminate. *v. n.* To be limited; to end; to have an end; to attain its end (*Dryden*).

TE'RMINATION. *s.* (from *terminate.*) 1. The act of limiting or bounding. 2. Bound; limit (*Brown*). 3. End; conclusion. 4. Last purpose (*White*). 5. End of words as varied by their significations (*Watts*). 6. Word; term: not in use (*Shakspeare*).

TERMINI, a town on the N. coast of Sicily, in Val di Mazara, with a strong castle. It is famous for its mineral waters, and has a fine aqueduct. It stands near the mouth of a river of the same name, 20 miles S. E. of Palermo.

Termini, in architecture, denotes a kind of statues or columns, adorned on the top with the figure of a man's, woman's, or satyr's head, as a capital; and the lower part ending in a kind of sheath or scabbard.

TERMINTHI. (*terminthus*, from τερμινθος, the turpentine tree.) In medicine. Black and ardent pustules, mostly attacking the legs of females; so called from their resemblance to the fruit of the turpentine tree.

TERMINUS, a fabulous divinity at Rome, who was supposed to preside over bounds and limits, and to punish all unlawful usurpation of land. He was represented with an human head without feet or arms, to intimate that he never moved, wherever he was placed. It is said that when Tarquin the proud wished to build a temple on the Tarpeian rock to Jupiter, the god Terminus refused to give way, though the other gods resigned their seats with cheerfulness.

TE'RMLESS. *a.* (from *term.*) Unlimited; boundless (*Raleigh*).

TE'RMLY. *ad.* (from *term.*) Term by term (*Bacon*).

TERN, in ornithology. See Sternus.

Tern, three-fold, in threes.

TE'RNARY. Te'rnion. *s.* (*ternarius*, *ternio*, Latin.) The number three (*Holder*).

TERNATE, the most northern and important island of the proper Moluccas, though not above 25 miles in circumference. It is mountainous, and has a great number of woods, which furnish much game; but it produces a great quantity of cloves and other fruits proper to the climate. The chief quadrupeds are goats, deer, and hogs; and the birds are of distinguished beauty, particularly the kingfisher, of a scarlet and mazareen blue. The boa-serpent is sometimes found here, of the length of 30 feet, and is reported sometimes to swallow even small deer. Ternate is governed by a sultan, who also controls Machian, Motir, and Mortay, with the N. part of Gilolo, and even some Celebezian isles, and part of Papua, whence he receives a tribute of gold, amber, and birds of paradise. In 1638 the Dutch formed an alliance with the sultan of Ternate and the lesser princes, which has been repeatedly renewed; but garrisons are established to enforce the observance. This island lies a little to the W. of Gilolo. Lon. 126. 38 E. Lat. 1. 20 N.

Ternate leaf. Ternatum folium. In botany. Having three leaflets on one petiole: as in trefoil, strawberry, bramble, &c. Linnéus makes it a species of the digitate.

Ternate (Doubly). See Biternate.

TERNI, a town of Italy, in the duchy of Spoleto, seated on the Nera, near the influx of the Velino, which has a famous cataract a mile from the town. Terni is the birthplace of Tacitus the historian. It is 15 miles S.S.W. of Spoleto, and 46 N. of Rome.

TERNOVA, an ancient town of Turkey in Europe, in Bulgaria, with an archbishop's see. It was formerly the seat of the princes of Bulgaria, and is seated on a mountain, near the Jenera, 88 miles N.W. of Adrianople, and 97 N.E. of Sophia. Lon. 26. 2 E. Lat. 43. 1 N.

TERNSTRÆMIA, in botany, a genus of the class polyandria, order monogynia. Calyx five-parted; corol one-petalled, wheel-shaped, with a five or six-parted border; anthers thick at top; berry juiceless, two-celled. Five species; natives of Japan, the West Indies, or Guiana. The species most worthy of notice is ternstræmia meridionalis, a West Indian tree, with alternate, coriaceous, oval, obtuse leaves; two-edged peduncles, drooping, much shorter than the leaves; seeds red, silky.

TERPANDER, a lyric poet and musician of Lesbos, 675 B. C. It is said that he appeased a tumult at Sparta by the melody and sweetness of his notes. He added three strings to the lyre, which before his time had only four.

TERPSICHORE, one of the muses, daughter of Jupiter and Mnemosyne. She presided over dancing. She is represented like a young virgin crowned with laurel, and holding in her hand a musical instrument.

TERRA, one of the most ancient deities in mythology, wife of Uranus, and mother of Oceanus, the Titans, Cyclops, Giants, Thea, Rhea, Themis, Phœbe, Thetys, and Mnemosyne. By the Air she had Grief, Mourning, Oblivion, Vengeance, &c. According to Hyginus, she is the same as Tellus.

Terra a terra, in the manage, a series of low leaps, which a horse makes forwards, bearing side-ways, and working upon two treads. In this motion a horse lifts both his fore-legs at once; and when these are upon the point of descending to the ground, the hinder legs accompany them with a short and quick cadence, always bearing upon the haunches; so that the motions of the hinder-quarters are short and quick; and the horse being always well pressed and coupled, he lifts his fore-legs pretty high, and his hinder legs keep always low, and near the ground. This manage is called *terra a terra*, because in this motion the horse does not lift his legs so high as in corvets.

Terra catechu. See Catechu and Mimosa.

Terra foliata tartari. See Kali acetatum.

Terra japonica. The inspissated juice of the mimosa catechu, which grows in great abundance in the kingdom of Bahar. It is prepared from a decoction of the inner part of the wood. From the negligent method in which it is dried in little kilns dug for that purpose, it acquires the earthy appearance it in general has, from which circumstance it takes its name. In the kingdom of Bahar, besides being much used in medicine, it is employed for many purposes in arts, particularly for painting the beams of houses to defend them from vermin. See Catechu and Mimosa.

Terra merita. The turmeric root is sometimes so called. See Curcuma.

Terra ponderosa salita. See Murias barytæ.

Terra sigillata. See Bole.

Terræ oleum. See Petroleum.

Terra del Fuego. See Tierra del Fuego.

Terra di Lavoro. See Lavoro.

Terra d'Otranto. See Otranto.

Terra Firma, or Tierra Firme, a kingdom of South America, bounded on the N. by the Caribbean Sea, on the N.E. by the Atlantic, on the S.E. by Guiana and Amazonia, on the S. by New Granada, and on the W. by the Pacific Ocean and the isthmus of Darien, which last separates it from North America. Its length, from the Atlantic to the Pacific Ocean, is upward of 1300 miles: its greatest breadth is 750; but in some places toward the Oronoko, not above 180. It is divided into the provinces of Terra Firma Proper, or Darien, Carthagena, St. Martha, Rio de la Hacha, Venezuela, Caraccas, Cumana, and Paria, or New Andalusia. The whole country is now subject to the viceroy of New Granada, who resides at St. Fé de Bogota.

Terra Firma Proper, another name for the province of Darien, in America. See Darien.

TE'RRACE. *s.* (*terrace*, French; *terraccia*, Italian.) 1. A small mount of earth covered with grass (*Temple*). 2. A balcony; an open gallery (*Dryden*).

To Te'rrace. *v. a.* (from the noun.) To open to the air or light (*Wotton*).

TERRACINA, a decayed town of Italy, in Campagna di Roma, with a bishop's see. It was called Anxur, was the capital of the war-like Volci, and the principal church was originally a temple of Jupiter. It is seated among orange and citron groves, near the sea, on the side of a mountain, 46 miles S.E. of Rome. Lon. 13. 15 E. Lat. 41. 24 N.

TERRAIGNOL, in the manage. A horse so called, is one that cleaves to the ground, that cannot be made light upon the hand, that cannot be put upon his haunches, that raises his fore-quarters with difficulty, that is charged with shoulders, and, in general, one whose motions are all short, and too near the ground.

TERRAIN, in the manage, is the managed ground upon which the horse marks his tread. It is said "This horse observes his ground well."

TERRANOVA, a town of Sicily, in Val di Noto. It belongs to the duke of Monte-Leone, and is seated near the mouth of a river of the same name, 20 miles E.S.E. of Alicata. Lon. 14. 10 E. Lat. 37. 9 N.

TERRA NUOVA, an ancient seaport, on the N.E. coast of Sardinia, seated at the bottom of a gulf of the same name, 65 miles N.N.E. of Sassari. Lon. 9. 35 E. Lat. 41. 3 N.

TERRA'QUEOUS. *a.* (*terra* and *aqua*, Latin.) Composed of land and water (*Woodward*).

TERRE'NE. *a.* (*terrenus*, Latin.) Earthly; terrestrial (*Hooker*).

TE'RREOUS. *a.* (*terreus*, Latin.) Earthly; consisting of earth (*Brown*).

TERRE'STRIAL. *a.* (*terrestris*, Latin.) 1. Earthly; not celestial (*Spenser*). 2. Terreous. Improper (*Woodward*).

To TERRE'STRIFY. *v. a.* (*terrestris* and *facio*, Latin.) To reduce to the state of earth (*Brown*).

TERRE'STRIOUS. *a.* (*terrestris*, Latin.) Terreous; earthy; consisting of earth (*Brown*).

TE'RRIBLE. *a.* (*terribilis*, Latin.) 1. Dreadful; formidable; causing fear (*Shaks.*). 2. Great, so as to offend: a colloquial hyperbole (*Clarendon*).

TE'RRIBLENESS. *s.* Formidableness; the quality of being terrible; dreadfulness (*Sid.*).

TE'RRIBLY. *ad.* (from *terrible.*) 1. Dreadfully; formidably; so as to raise fear (*Dryden*). 2. Violently; very much (*Swift*).

TERRIER, a book, or roll, wherein the several lands, either of a private person, or of a town, college, church, &c. are described. It should contain the number of acres, and the site, boundaries, tenants names, &c. of each piece or parcel.

TERRIER. (The legislature has chosen to spell this *tarrier*, in the dog act, as if it were rather derived from the perseverance of the dog in the earth, when he is, in the language of the kennel, laying at the fox, than his being always employed under ground.) A kind of mongrel greyhound, used chiefly for hunting the fox or badger; so called because he creeps into the ground, as the ferrets do into the coney burrows, and there nips and bites the fox and badger, either tearing them in pieces with his teeth, or else hauling and pulling them by force out of their lurking holes; or at least driving them out of their hollow harbours, to be taken by a net or otherwise.

For the purposes of badger baiting they have, by the lower classes, been crossed, and bred *in* and *in* with the bull-dog, which has enlarged the produce of those crosses, and increased their natural ferocity. The genuine and less breed of terrier is employed in a business to which, by his size, his fortitude, and invincible ardour, he seems more peculiarly adapted, and may be truly said "to labour cheerfully in his vocation." This is in his attendance upon the chase, where, like distinguished personages in a procession, though last, he is not the least in consequence.

Terriers of even the best blood are now bred of all colours; red, black, (with tan faces, flanks, feet, and legs,) brindled sandy; some few brown pied, white pied, and pure white; as well as one sort of each colour rough and wire-haired; the others soft and smooth; and, what is rather extraordinary, the latter not much deficient in courage compared with the former; but the rough breed must be acknowledged the most severe and invincible biter of the two. Since fox-hunting is so popular in every county where it can be enjoyed, these faithful little animals have become so exceedingly fashionable, that few stables of independent gentlemen are seen without them. Four and five guineas is no great price for a handsome well-bred terrier; and, a very short time since, seven puppies were sold at the Running-horse livery-stables, in Piccadilly, for 21 guineas.

With every established pack of fox-hounds there is seldom to be seen less than a brace of terriers: and, for the best of reasons, one is generally larger and stronger than the other; namely, that in a small earth where one cannot enter the other may. With the hounds, in endeavouring to find, as well as during the chase, their exertions are incessant and indefatigable; and although the fleet pack shall be carrying the scent breast-high at the top of their speed, these instinctive devotees to the sport are seldom far behind them. When a fox is run to earth, it is the province of the terrier to follow, and lay at him; as, by the baying of the one at the other, the ear will soon be informed whether the fox lay deep, or near the surface; and those who are employed in digging him out will be enabled to proceed accordingly. In fidelity, sagacity, courage, as well as the most incredible endurance of fatigue and hunger, these dogs are inferior to no one particular tribe of the canine species.

TERRI'FIC. *a.* (*terrificus*, Latin.) Dreadful; causing terror (*Philips*).

To TE'RRIFY. *v. a.* (*terror* and *facio*, Latin.) To fright; to shock with fear; to make afraid (*Blackmore*).

TE'RRITORY. *s.* (*territorium*, law Latin.) Land; country; dominion; district (*Denh.*).

TE'RROUR. *s.* (*terror*, Latin; *terreur*, French.) 1. Fear communicated (*Milton*). 2. Fear received (*Knolles*). 3. The cause of fear (*Prior*).

TERRUEL, a town of Spain, in Arragon, with a bishop's see, seated in a large fertile plain, at the confluence of the Guadalquiver and Alhambra, 75 miles S.W. of Saragossa, and 112 E. of Madrid. Lon. 1. 0 W. Lat. 40. 25 N.

TERSE. *a.* (*tersus*, Latin.) 1. Smooth: not in use (*Brown*). 2. Cleanly written; neat (*Swift*).

TERTIAN AGUE. See FEBRIS INTERMITTENS.

TERTIANARIA. (from *tertiana*, a species of intermitting fever which is said to be cured by this plant.) The plant which is thus called in some pharmacopœias is the scutellaria galericulata foliis cordato lanceolatis, crenatis; floribus axillaribus of Linnéus, which is common in the hedges and ditches of this country. It has a bitter taste and a garlic smell, and is said to be serviceable against that species of ague which attacks the patient every third day.

To TERTIATE. *v. n.* (*tertio*, *tertius*, Latin.) To do any thing the third time.

TERTULLIAN, or QUINTUS SEPTIMUS

Florens Tertullianus, a celebrated priest of Carthage, was the son of a centurion in the militia, who served as proconsul of Africa. He was educated in the Pagan religion; but being convinced of its errors, embraced Christianity, and became a zealous defender of the faith. He married, it is thought, after his baptism. Afterwards he took orders and went to Rome, where, during the persecution under the emperor Severus, he published his Apology for the Christians, which is, in its kind, a master-piece of eloquence and learning; and at the beginning of the third century he embraced the sect of the Montanists. He lived to a very great age, and died under the reign of Antoninus Caracalla, about the year 216. Many of his works are still extant, in all of which he discovers a great knowledge of the Holy Scriptures, a lively imagination, a strong, elevated, and impetuous style, great eloquence and strength of reasoning; but is sometimes obscure. His Apology and Prescriptions are most esteemed. The best editions of his works are those of Rigault; especially that of Venice in 1746, folio. Pamelius and Alix, Mr. Thomas, and the sieur du Fossé, have written his life; and Rigault, M. de l'Aube Epine, father Petau, and other learned men, have published notes on his works.

TERVERE, or Veere, a town of the United Provinces, in Zealand, on the N.E. coast of the isle of Walcheren, with a good harbour, and a fine arsenal, four miles N.E. of Middleburg. Lon. 3. 42 E. Lat. 51. 36 N.

TESCHEN, a town of Upper Silesia, capital of a duchy of the same name, subject to the house of Austria. It was taken by the Prussians in 1757, but restored in 1763. It is surrounded on all side by a morass, and seated near the source of the Vistula. At a little distance from it is an old castle, on an eminence, where the ancient dukes resided. The inhabitants carry on a trade in leather, woollen stuffs, and Hungary wines; and make pretty good fire-arms, and excellent beer. A treaty of peace was concluded here in 1779, between emperor Joseph II. and Frederic William III. of Prussia. It is 27 miles S.E. of Troppau, and 65 S.W. of Cracow. Lon. 18. 17 E. Lat. 49. 52 N.

TESEGDELT, a town of Morocco Proper, surrounded by a craggy rock, which renders it impregnable. It is seated at the mouth of the Techubit, 200 miles W. of Morocco.

TESINO, a river of Swisserland, which has its source in Mount St. Gothard, flows through the country of the Grisons, and the lake Maggiore; then running through part of the Milanese, it washes Pavia, and a little after falls into the Po.

TESSELATED PAVEMENTS, those of rich Mosaic work made of curious square marbles, bricks, or tiles, called *tesselæ* from their resembling dice.

TESSERA, in Roman antiquity, denoted in its primary sense a cube or dye; so called from the Greek word τεσσαρα, or τεσσερα, four; respect being had to its number of sides, distinct from the two horizontal planes above and below. And it was thus distinguished from the talus, which being round at each end, contained only four planes or faces on which it could stand; and, therefore, when thrown, had no more than two side faces in view. Hence *ludere talis et ludere tesseris* are spoken of by Roman writers as two different games. The syllable *tes* occurs often in Roman inscriptions. The word *tessera* was applied to many other things, not so much from a similitude in the figure, as from the relation they bore to some other thing of which they were the sign or token; as the points on the upper plane of the dye denoted the good or ill success of the cast.

TESSIA, a town of Austria, in the county of Tirol, 22 miles N.E. of Trent, and 24 S.E. of Bolzano. Lon. 11. 40 E. Lat. 46. 20 N.

TEST, or Tese, a river which rises in the N.W. of Hants, and watering Stockbridge and Rumsey, falls into the bay of Southampton.

Test. *s.* (*test*, French; *testa*, Italian.) 1. The cupel by which refiners try their metals. 2. Trial; examination: as by the cupel (*Shakspeare*). 3. Means of trial (*Ben Jonson*). 4. That with which any thing is compared in order to prove its genuineness (*Pope*). 5. Discriminative characteristic (*Dryden*). 6. Judgment; distinction (*Dryden*).

Test-act, in law, is the statute 25 Car. II. cap. 2. which directs all officers, civil and military, to take the oaths, and make the declaration against transubstantiation, in the court of King's Bench or Chancery, the next term, or at the next quarter sessions, or (by subsequent statutes) within six months after their admission; and also within the same time to receive the sacrament of the Lord's supper, according to the usage of the church of England, in some public church, immediately after divine service or sermon, and to deliver into court a certificate thereof, signed by the minister and churchwarden, and also to prove the same by two credible witnesses, upon forfeiture of 500*l.* and disability to hold the said office.

The word test signifies proof or trial, being formed of *testis*, witness; this act being established with a view to exclude Roman catholics from any share in the government, though it has operated to the exclusion of protestant dissenters in general.

It may here be observed, that the original design of the test was not to exclude the protestant dissenters, but the papists. It was brought in by the patriots, in the reign of Charles II. under their apprehension of popery, and a popish successor; and when, during the debate in the house of commons, it was observed, that it was drawn in such a manner as to comprehend the protestant dissenters, the court greatly endeavoured to avail themselves of that circumstance in order to defeat the bill. But the dissenting members disappointed them, by declaring, that they had rather confide in the justice and generosity of parliament, to pass some future bill in their favour, than be the occasion of retarding or defeating the security which the present bill was calculated to afford to the liberties of their country. Their patriotism produced soon afterwards a bill for their relief from the penal laws; but the parliament was prorogued, through the resentment of the court, to prevent its passing: and when, notwithstanding this, a bill in favour of the dissenters did afterwards pass both houses, and lay ready for the royal assent, the court ventured upon a very extraordinary expedient: the clerk of the crown was ordered to convey away the bill, and, accordingly, it was never afterwards to be found. The particular test of receiving the sacrament according to the rites of the church of England was calculated to exclude the papists rather than the protestant dissenters; as it was no uncommon thing for the latter, at that time, to receive the sacrament occasionally in the church of England, in order to express their charity towards it, as a part of the church of Christ. If it had been the design of the legislature to exclude all from civil offices, but those who have a real affection for the constitution and worship of the church, it is apprehended they would have appointed the test to be, not merely once taking the sacrament at church, but a stated and constant conformity to its religious services. Furneaux's Letters to judge Blackstone, p. 133. See Nonconformists and Toleration.

TESTACEA, in zoology, the third order of the class vermes or worms, including molluscæ, covered with calcareous habitations or shells, which they carry about with them; themselves producing, and often penetrating calcareous bodies. Like insects, they are multiplied into a vast number of species and varieties; and both in their forms and colours exhibit splendid examples of the power of the almighty Artificer.

TESTA'CEOUS. *a.* (*testaceus*, Latin.) 1. Consisting of shells; composed of shells. 2. Having continuous, not jointed shells: opposed to *crustaceous* (*Woodward*).

TESTAMENT, Testamentum, in law, a solemn and authentic act, whereby a person declares his will, as to the disposal of his estate, effects, burial, &c.

Testaments, according to Justinian and sir Edward Coke, are so called because they are *testatio mentis*; an etymon, says judge Blackstone, which seems to savour too much of the conceit, it being plainly a substantive derived from the verb *testari*. The definition of the old Roman lawyers is much better than their etymology; *voluntatis nostræ justa sententia de eo, quod quis post mortem suam fieri velit*, i. e. the legal declaration of a man's intentions, which he wills to be performed after his death. It is called *sententia*, to denote the circumspection and prudence with which it is supposed to be made: it is *voluntatis nostræ sententia*, because its efficacy depends on its declaring the testator's intention, whence in England it is emphatically styled his *will*: it is *justa sententia*, that is, drawn, attested, and published with all due solemnities and forms of law: it is *de eo, quod quis post mortem suam fieri velit*, because a testament is of no force till after the death of the testator. Blackstone's Com. vol. ii.

Testaments (Old and New), in religious technology, the respective portions of the revealed will of God, which were published before and after the advent of the Messiah. The word testament here, however, as well as in Luke xxii. 20. and 1 Cor. xi. 25. is an improper rendering from the old Latin versions. The Greek word is διαθηκη, which may far more properly be rendered covenant than testament or will. The old covenant, to which the new is opposed, cannot with any propriety be called a testament, with reference to the death of any testator, though that is the idea chiefly insisted on by those who prefer the word testament. See Bible, Canon, &c.

TESTAME'NTARY. *a.* (*testamentarius*, Latin.) Given by will; contained in wills (*Atterbury*).

TE'STATE. *a.* (*testatus*, Latin.) Having made a will (*Ayliffe*).

TESTA'TOR. *s.* (*testator*, Latin.) One who leaves a will (*Taylor*).

TESTA'TRIX. *s.* (Latin.) A woman who leaves a will.

TESTE, in law, a word generally used in the conclusion of every writ, wherein the date is contained, and begins with *teste meipso*, &c. in case it is an original writ; or, if only judicial, then with *teste*, naming the chief justice of the bench whence the writ issues.

TE'STED. *a.* (from *test*.) Tried by a test (*Shakspeare*).

TE'STER. *s.* (*teste*, French, a head.) 1. A sixpence (*Pope*). 2. The cover of a bed.

TESTES CEREBRI See Tubercula quadrigemina.

TESTICLE. (*testis*.) Two small oval bodies situated within the scrotum, and covered by a strong, white, and dense coat, called tunica albuginea testis. Each testicle is composed of small vessels, bent in a serpentine direction, arising from the spermatic artery, and convoluted into little heaps, separated from one another by cellular partitions. In each partition there is a duct receiving semen from the small vessels; and all the ducts constitute a net which is attached to the tunica albuginea. From this net-work twenty or more vessels arise, all of which are variously contorted, and, being reflected, ascend to the posterior margin of the testis, where they unite into one common duct, bent into serpentine windings, and forming a hard body called the epididymis. The spermatic arteries are branches of the aorta. The spermatic veins empty themselves into the vena cava and emulgent vein. The nerves of the testicle are branches of the lumbar and great intercostal nerve. The use of the testicle is to secrete the semen.

Testicle (Swelled). See Orchitis.

TESTICULUS. (*testis.*) A small testicle.

TESTICULUS CANINUS. See SATYRION.

TESTIFICA'TION. s. (*testificatio*, Latin, from *testify*.) The act of witnessing (*Hooker*).

TESTIFICA'TOR. s. (from *testificor*, Latin.) One who witnesses.

TE'STIFIER. s. (from *testify*.) One who testifies.

To **TE'STIFY.** *v. n.* (*testificor*, Latin.) To witness; to prove; to give evidence (*Milton*).

To **TE'STIFY.** *v. a.* To witness; to give evidence of any point (*John*).

TE'STILY. *ad.* (from *testy*.) Fretfully; peevishly; morosely.

TESTIMO'NIAL. s. (*testimonial*, French; *testimonium*, Latin.) A writing produced by any one as an evidence for himself (*Burnet*).

TE'STIMONY. *s.* (*testimonium*, Latin.) 1. Evidence given; proof by witness (*Dryden*). 2. Public evidences (*Milton*). 3. Open attestation; profession (*Milton*).

To **TE'STIMONY.** *v. a.* To witness: not used (*Shakspeare*).

TE'STINESS. *s.* (from *testy*.) Moroseness; peevishness (*Locke*).

TESTIS. (*testis*, a witness, the testes being the witnesses of our manhood.) Two prominences of the brain are called testes from their supposed resemblance. See TESTICLE.

TESTU'DINATED. *a.* (*testudo*, Latin.) Roofed; arched.

TESTUDI'NEOUS. *a.* (*testudo*, Latin.) Resembling the shell of a tortoise.

TESTUDO, in zoology, a genus of the class amphibia, order reptilia. Body tailed, covered above and beneath with a bony or coriaceous shell, or scales above; upper jaw inclosing the lower, like the lid of a box. Thirty-five species, scattered over the globe. They are thus subdivided:

A. Legs fin-shaped, the foremost longer than the rest: constituting the tribe of marine turtles. Four species.

B. Feet palmate; shell joined to the chest by a membrane, and propped on each side in the middle by two processes of the rest. These include the tribe of river turtles.

C. Feet clavate, clawed; shell convex, joined to the chest by bony commissures. The tribe of land tortoises.

All these are held in abomination by the Persians; are very fertile; and in the egg state the prey of many ravenous animals; feed on worms; the marine ones on sea-weeds, and when tamed will eat almost any thing; are extremely slow, and in copulation frequently adhere together a month: are capable of existing a long time in noxious air; and so tenacious of life, that if the head be cut off, or the chest opened, they will live several days: the land tribe are torpid during the winter in cold climates. The shell consists of two connected lamina; the upper convex, covered with scutels, which, of the disk, are thirteen, of the margin twenty-four; the lower concave, particularly in the male, obtuse on the fore-part, and notched behind, divided by sutures into scutels; between the two laminæ is an anterior aperture for the head and arms, and a posterior one for the tail and thighs.

We shall select a few specimens from each division. The following are from the division A.

1. T. mydas. Green turtle. Fore-feet two-clawed; hind-feet solitary; shell oval.

Four other varieties, as follow:

β. Claws pointed, one on each foot.
γ. Beak like the bill of a goose.
δ. Beak like the bill of a fowl.
ε. Plate of the shell very large.

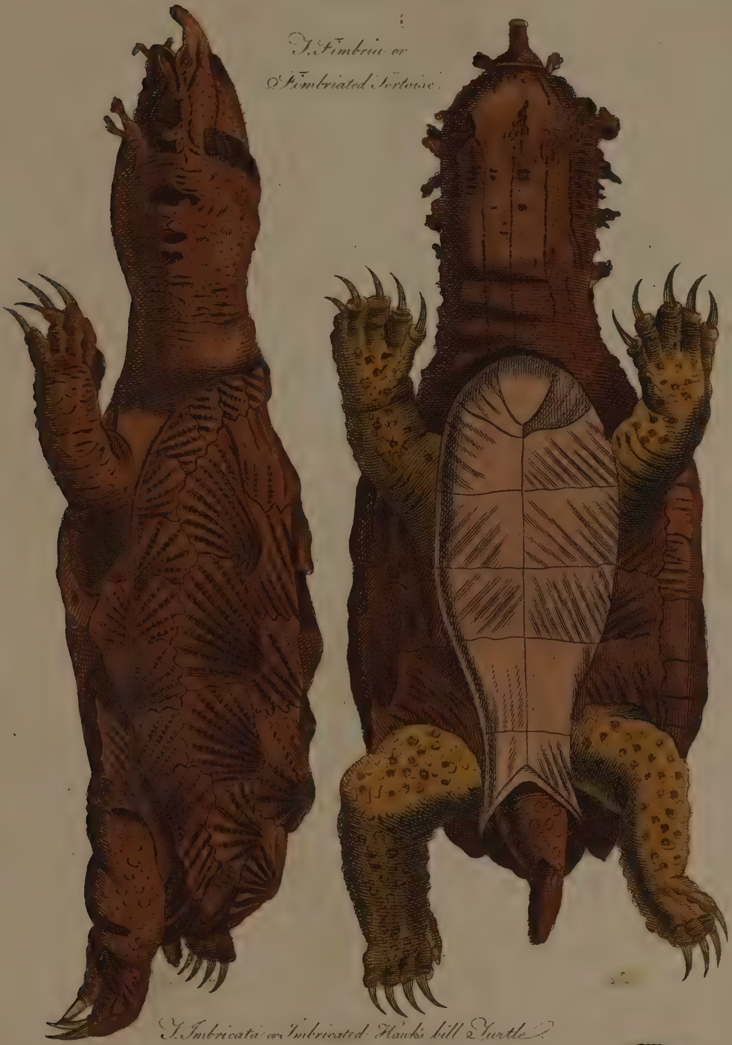
The green turtle, so named not on account of its being externally of that colour, but from the green tinge which its fat frequently exhibits when the animal is taken in its highest state of perfection, may be considered as one of the largest of this genus, often measuring above five feet in length, and weighing more than five or six hundred pounds. Its shell is of a somewhat heart-shaped form, or pointed at the extremity, and consists of thirteen dorsal segments or divisions surrounded by twenty-five marginal pieces. Its colour is a dull, palish brown, more or less variegated with deeper undulations, but not exhibiting those strong and beautiful colours which so peculiarly distinguish that of the testudo imbricata, or hawk's bill turtle, which affords the tortoise shell for ornamental purposes, and in various manufactures, having neither sufficient strength nor beauty; but so much is the flesh esteemed, that the inhabitants of the West Indian islands have long considered it as one of the most excellent articles of food, and have gradually succeeded in introducing a similar taste among some of the European nations. In our own country, in particular, it is in the highest estimation, and is regularly imported in considerable quantities to supply the luxury of the metropolis. The introduction of the green turtle, as an article of luxury, into England, is of no very distant date, and, perhaps, can hardly be traced much farther than about 50 or 60 years backward. In reality, so little was the nature of the sea tortoises understood by the Europeans before that period, that the different kinds were in general confounded by navigators, whose accounts relative to their character as a food varied according to the species which they happened to take for that purpose; some insisting that the turtle was a coarse and unpalatable diet, while others considered it as of the highest degree of excellence.

"Of the sea turtles," says Catesby, "the most in request is the green turtle, which is esteemed a most wholesome and delicious food. It receives its name from the fat, which is of a green colour." Sir Hans Sloane informs us, in his History of Jamaica, that forty sloops are employed by the inhabitants of Port Royal, in Jamaica, for the catching them. The markets are there supplied with turtle as ours are with butcher's meat. The Bahamians carry many

NATURAL HISTORY.

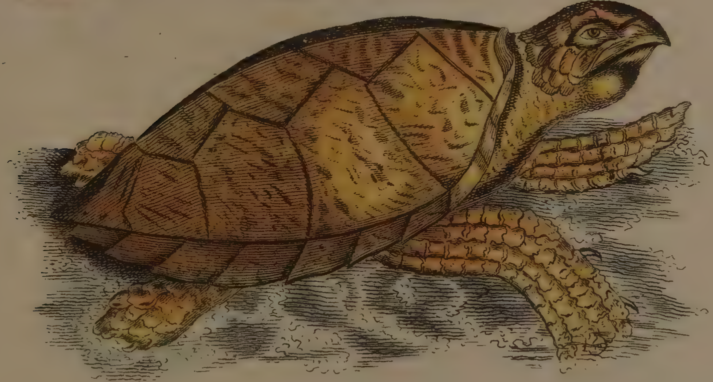
PL. LXXXII.

Testudo.



T. Fimbria or Fimbriated Tortoise.

T. Imbricata or Imbricated Hawk's bill Turtle.



London, Published by Sherwood & C.o Paternoster Row, Oct.r 1st 1812.

of them to Carolina, where they turn to good account; not because that plentiful country wants provisions, but they are esteemed there as a rarity, and for the delicacy of their flesh. They feed on a kind of grass, growing at the bottom of the sea, commonly called turtle grass. The inhabitants of the Bahama islands, by often practice, are very expert at catching turtles, particularly the green turtle. In April they go in little boats to Cuba and other neighbouring islands, where in the evening, especially in moonlight nights, they watch the going and returning of the turtle to and from their nests, at which time they turn them on their backs, where they leave them, and proceed on, turning all they meet; for they cannot get on their feet again when once turned. Some are so large that it requires three men to turn one of them. The way by which the turtle are most commonly taken at the Bahama islands is by striking them with a small iron peg of two inches long, put in a socket, at the end of a staff twelve feet long. Two men usually set out for this work in a little light boat or canoe, one to row gently and steer the boat, while the other stands at the head with his striker. The turtle are sometimes discovered by their swimming with their head and back out of the water, but they are often discovered lying at the bottom, a fathom or more deep. If a turtle perceives he is discovered, he starts up to make his escape: the men in the boat pursuing him, endeavour to keep sight of him, which they often lose, and recover again by the turtle putting his nose out of the water to breathe: thus they pursue him, one paddling or rowing, while the other stands ready with his striker. It is sometimes half an hour before he is tired: then he sinks at once to the bottom, which gives them an opportunity of striking him, which is by piercing him with an iron peg, which slips out of the socket, but is fastened with a string to the pole. If he is spent and tired by being long pursued, he tamely submits, when struck, to be taken into the boat or hauled ashore. There are men who by diving will get on their backs, and by pressing down their hind parts, and raising the fore part of them by force, bring them to the top of water, while another slips a noose about their necks.

Though the green turtle is a native of the West Indian seas, yet it is sometimes driven by storms out of its usual residence, and instances have occurred in which it has been taken on the coasts of Europe. An occurrence of this kind is said, by the count de Cepede, to have happened in France; a turtle having been taken at Dieppe, in the year 1752, which weighed between eight and nine hundred pounds, and was almost six feet in length, and four wide. It may, however, be doubted whether this animal was not rather a caretta or loggerhead than a green turtle. Another, of still larger size, is also said to have been taken on the coast of France, about two years afterwards.

"The sea tortoises, or turtles in general," says Catesby, "never go on shore but to lay their eggs, which they do in April: they then crawl up from the sea above the flowing of high water, and dig a hole above two feet deep in the sand, into which they drop in one night above a hundred eggs, at which time they are so intent upon nature's work, that they regard none that approach them; but will drop their eggs into a hat, if held under them; but if they are disturbed before they begin to lay, they will forsake the place, and seek another. They lay their eggs at three, and sometimes at four different times; there being 14 days between every time; so that they hatch and creep from their holes into the sea at different times also. When they have laid their complement of eggs, they fill the hole with sand, and leave them to be hatched by the heat of the sun, which is usually performed in about three weeks. It may be proper to add, that the eggs are about the size of tennis balls, round, white, and covered with a smooth parchment-like skin.

2. T. caretta. Loggerhead turtle. Plates of the back gibbous behind; fore and hind feet two-clawed.

In its general appearance this species most resembles the preceding; but is distinguished by the superior size of the head, the proportional breadth of the shell, and by its deeper and more variegated colours, resembling those of the testudo imbricata, or hawk's bill; but its principal mark of distinction consists in the number of dorsal segments or scutella of the shell, which, instead of thirteen, as in other species, amount to fifteen; the lateral as well as the middle range containing five pieces, of which the two superior are considerably smaller than the rest. The fore feet are very large and long; the hind feet much shorter, though broad. This animal inhabits the same seas with the green turtle, but is also diffused into very remote latitudes, being often found in the Mediterranean, and, in particular, about the coasts of Italy and Sicily. Considered in a commercial view, it is of little or no value; the flesh being coarse and rank, and the laminæ or plates of the shell too thin for general use. It is said, however, to afford a good quantity of oil, which may be used for lamps, &c. The loggerhead turtle is a very strong and fierce animal, and is even dangerous; defending itself with great vigour with its legs, and being able to break the strongest shells and other substances with its mouth. Aldrovandus assures us, that on offering a thick walking-stick to one which he saw publicly exhibited at Bologna, the animal bit it in two in an instant.

"The loggerhead turtles," says Catesby, "are the boldest and most voracious of all turtles; their flesh is rank, and therefore little sought for, which occasions them to be more numerous than any other kind. They range the ocean over, an instance of which, among many others that I have known, happened on the 20th of April, 1725, in lat. 30 degrees north; when our boat was hoisted out, and a loggerhead turtle struck as it was sleeping on the surface of the water: this, by our reckoning, appeared to be the midway between the Azores and the Bahama islands; either of which places being nearest land it could come from, or that they are known to frequent; there being none on the north continent of America farther north than Florida. It being amphibious, and yet at so great a distance from land in the breeding time, makes it the more remarkable. They feed mostly on shell-fish, the great strength of their beaks enabling them to break very large shells, as the large buccinums and trochi."

3. T. imbricata. Hawk's bill turtle. This species is named imbricata from the peculiar disposition of its scales or laminæ, which commonly lap over each other at their extremities, in the manner of tiles on the roof of a building. The outline of the shell, viewed from above, is more heart-shaped than in other sea tortoises, and terminates more acutely; each of the middle row of scales on the back is also of a sharpened form at the tip, more especially in the young or half grown animal, and has a ridge or carina down the middle: the head is smaller in proportion than in other turtles; the neck longer; and the beak narrower, sharper, and more curved, so as to bear no inconsiderable resemblance to the bill of a hawk, from which circumstance the animal derives its common or popular name of the hawk's bill turtle. The fore legs are longer than in the rest of the tribe; and it is said, that when turned or laid on its back, the animal is enabled, by their assistance, to reach the ground in such a manner as to recover its former situation, which no other turtle can do. In old specimens, the neatness of the shell, and the well defined outline of the scales, are occasionally impaired, and this seems to be one principal reason of its having been sometimes confounded with the caretta, or loggerhead turtle. The hawk's bill turtle is a native of the Asiatic and American seas, and is sometimes, though less frequently, found in the Mediterranean. Its general length seems to be about three feet, from the tip of the bill to the end of the shell; but it has been known to measure five feet in length, and to weigh five or six hundred pounds. In the Indian ocean in particular, specimens are said to have occurred of prodigious magnitude.

The shell of this animal was anciently used for a shield, and still serves for that purpose among barbarous nations. The flesh is in no estimation as food; the lamellæ or plates of the shell, which are far stronger, thicker, and clearer, than in any other kind, constituting the sole value of the animal, and affording the substance particularly known by the name of tortoise shell: they are semi-transparent, and most elegantly variegated with whitish, yellowish, reddish, and dark brown clouds and undulations, so as to constitute, when properly prepared and polished, one of the most elegant articles for ornamental purposes. See TORTOISE SHELL. The natural or general number of the dorsal pieces is thirteen; the marginal row consisting of twenty-five smaller pieces. This external coating is raised or separated from the bony part, which it covers, by placing fire beneath the shell; the heat soon causing the plates to start, so as to be easily detached from the bone. These plates vary in thickness, according to the age and size of the animal, and measure from an eighth to a quarter of an inch in thickness. A large turtle is said to afford about eight pounds of tortoise shell.

In order to bring tortoise shell into the particular form required on the part of the artist, it is steeped in boiling water till it has acquired a proper degree of softness, and immediately afterwards committed to the pressure of a strong metallic mould of the figure required; and where it is necessary that pieces should be joined, so as to compose a surface of considerable extent, the edges of the respective pieces are first scraped or thinned, and being laid over each other during their heated state, are committed to a strong press, by which means they are effectually joined or agglutinated. These are the methods also by which the various ornaments of gold, silver, &c. are occasionally fixed to the tortoise shell. The Greeks and Romans appear to have been peculiarly partial to this elegant ornamental article, with which it was customary to decorate the doors and pillars of their houses, their beds, &c. &c. In the reign of Augustus this species of luxury seems to have been at its height in Rome. "The Egyptians," says Mr. Bruce, in the supplement to his Travels, "dealt very largely with the Romans in this elegant article of commerce. Pliny tells us that the cutting them for fineering or inlaying was first practised by Corvilius Pollio, from which we should presume that the Romans were ignorant of the art of separating the laminæ by fire placed in the inside of the shell when the meat is taken out; for these scales, though they appear perfectly distinct and separate, do yet adhere, and oftener break than split, when the mark of separation may be seen distinctly." Martial, Juvenal, and Apuleius, all allude to it as an inlay for beds, or rather bed-posts or pillars. When Alexandria was taken by Julius Cæsar, the magazines were so full of this material, that the conqueror proposed to employ it instead of ivory, which he employed on another occasion, as the chief ornament of his triumph. There is some doubt, however, whether the species figured and alluded to by Mr. Bruce is the real testudo imbricata: in several essential points it seems to differ considerably.

The following appertain to the section B, or river turtles.

4. T. ferox. Shell cartilaginous, oval; feet three-clawed; nostrils tubular, prominent. Head subtregonal, narrowed before, dilated behind; neck long, thick; eyes contiguous; eyelids broad, lax; pupil narrow; iris citron; each jaw consists of one bone; upper lip broader than the lower; nose like the snout of a mole, but soft, thin, pellucid, cartilaginous; arms thick, stout, and, with the hands, covered

with a lax, folding, dusky-green skin; fore feet with two spurious claws; hind feet only one, whitish; tail thick, broad, originating an inch beneath the vent, equal in length to the hinder part of the dorsal plate; dorsal plate black-brown, tinged with green, bony in the middle, cartilaginous, flexile on the sides, behind and before sprinkled with smooth, oblong tubercles; beneath whitish, elegantly veined; chest clear, whitish, cartilaginous on the fore part, and reaching two or three inches beyond the dorsal plate, behind bony, resembling a saddle.

Inhabits the rivers of South America; twenty inches long, fourteen broad; about seventy pounds in weight: flesh very delicate; is fierce, and defends itself by biting.

The soft-billed turtle of Bartram is the same, or only a variety of this species.

5. T. lutaria. Mud tortoise. Tail half as long as the body; shell flattish, carinate on the hind-part, with three scutels.

Another variety with a tubular, and a third with a campanulate shell. Inhabits lakes on the banks of the Tanais, Volga, Ural, and other Indian and Eastern rivers: and is said, by La Cepede, to be plentiful in Languedoc, Provence, and other provinces of France. Seven or eight inches long; three or four broad. Like other tortoises, sometimes utters a kind of broken or interrupted hiss. This species lays its eggs on land, digging for this purpose a hollow in the ground, and covering the eggs with the mould. The young, when first hatched, measure about six lines in diameter. This may be rendered domestic and useful in gardens, but is very troublesome in fishponds, attacking, wounding, destroying, and devouring its fishes.

6. T. Pensylvanica. Fore-feet five-clawed; hind-feet four-clawed; tail tipt with a sharp horn. Inhabits stagnant waters in Pensylvania; when alive smells of musk; by means of the tip of the tail turned in, it climbs up slippery hills, and stops itself at its option.

The following belong to the tribe C, or land tortoises.

7. T. Græca. Common tortoise. Feet subdigitate; shell gibbous behind; lateral margin very obtuse; scutels flattish; body tailed, six and a half inches long, four pounds weight; hind-feet four-toed; fore-feet generally five, sometimes four-toed; shell oval, very entire at the margin; plate very convex, and with the skin variegated black and yellow. Inhabits Africa and Sardinia: the Greeks are very fond of its flesh and eggs, and drink its blood: the male, when irritated, runs and buts its head against a stone; hides under ground in September, and emerges in February; lays from four to five white eggs, in holes which it digs in warm sunny places; size of the egg that of a pigeon's; the young come forth after the equinoctial rains, not larger than a walnut.

8. T. pusilla. Feet subdigitate; shell hemispheric, with convex, trapeziform scutels, the edge striate, the disk dotted: upper shell moderately convex, hardly the size of a man's hand; surrounded within the margin by a whitish band, and ornamented with twenty-two dusky, three-sided patches. Inhabits the Cape: when tamed eats any thing offered it, except milk or animal food, but abstains from food during the winter, and does not go into the water; is very slow of motion unless driven by heat. See Nat. Hist. Pl. CLXXXII.

TE'STY. *a.* (*testie*, Fr.; *testurdo*, Ital.) Fretful; peevish; apt to be angry (*Addison*).

TETANUS. (τετανος, from τεὶνω, to stretch.) Spasm with rigidity. A genus of disease in the class neuroses and order spasmi of Cullen; characterised by a spasmodic rigidity of almost the whole body. The varieties of tetanus are: 1. Opisthotonos, where the body is thrown back by spasmodic contractions of the muscles: 2. Emprosthotonos, the body being bent forwards: 3. Trismus, the locked jaw. Tetanus is often symptomatic of siphilis and worms.

TETBURY, a town in Gloucestershire, with a market on Wednesday, and a considerable trade in cheese, yarn, and wool. It is 25 miles E.N.E. of Bristol, and 99 W. of London. Lon. 1. 8 W. Lat. 51. 36 N.

TE'TCHY. *a.* Froward; peevish (*Shaks.*).

TETE A TETE. *s.* (French.) Cheek by jowl (*Prior*).

TE'THER. *s.* (See Tedder.) A string by which horses are held from pasturing too wide (*Swift*).

To Te'ther. *v. a.* To tie up.

TETHYS, the greatest of the sea deities, was wife of Oceanus, and daughter of Uranus and Terra. She was mother of the chiefest rivers of the universe, such as the Nile, the Alpheus, the Mæander, Simois, Peneus, Evenus, Scamander, &c. and about 3000 daughters called Oceanides.

Tethys, in zoology, a genus of the class vermes, order mollusca. Body detached, rather oblong, fleshy, without peduncles; mouth with a terminal, cylindrical proboscis, under an expanded membrane or lip; apertures two, on the left side of the neck. Two species: tethys leporina, with ciliate membrane or lip; inhabiting the Mediterranean. Tethys fimbria, with crenulate or pointed membrane or lip, inhabiting the Adriatic. They may be regarded as naked oysters, in the same manner as the terebella may be regarded as a naked teredo, or the slug as a naked snail. The last species is large, being not less than six inches in length.

TETRACERA, in botany, a genus of the class polyandria, order tetragynia. Calyx five or six-parted; petals four or five; filaments dilated upwards, bearing an anther on each side; capsules four, opening at the side; seeds coated at the base. Twelve species; the greater number bearing flowers with a single style, the rest flowers with about four styles. They are natives of the East or West Indies, or South America.

TETRACHORD. (from the Greek.) A concord in the music of the ancients, consisting of three degrees or intervals, and four terms or sounds, called by the Greeks also *diatessaron*, and by us a *fourth*. In this system the extremes were fixed, but the middle sounds were varied according to the mode.

In the ancient music, all the primitive or chief divisions were confined to four chords, so that the great scale consisted of replicates, and all the upper tetrachords were considered only as repetitions of the first or lowest.

TETRADIAPASON. The Greek appellation of the quadruple octave, which we also call the 29th. The system of the ancients not extending to this interval, they only knew it in imagination, or by name.

TETRADYNAMIA (τεσσαρες, four, and δυναμις, power), four powers; the name of the 15th class in Linnéus's Sexual System, consisting of plants with hermaphrodite flowers, having six stamina, four of which are long, and two short; it corresponds to the siliquosæ of Ray, and cruciformes of Tournefort. All the species belonging to this class are distinguished by cruciform flowers. It comprehends two orders, gymnospermia, those plants which have naked seeds, being four in number (except phryma, which is monospermous); and angiospermia, which contains those plants the seeds of which are inclosed in a capsule. See Botany.

TETRAEDRON, or Tetrahedron, in geometry, one of the five regular or platonic bodies or solids, comprehended under four equilateral and equal triangles. See Body.

If a denote the linear edge or side of a tetraedron, b its whole superficies, c its solidity, r the radius of its inscribed sphere, and R the radius of its circumscribing sphere; then the general relation among all these is expressed by the following equations, viz.

$$a = 2r\sqrt{6} = \tfrac{2}{3}R\sqrt{6} = \sqrt{\tfrac{1}{3}b\sqrt{3}} = \sqrt[3]{6c\sqrt{2}}.$$
$$b = 24r^2\sqrt{3} = \tfrac{8}{3}R^2\sqrt{3} = a^2\sqrt{3} = 6\sqrt[3]{c^2\sqrt{3}}.$$
$$c = 8r^3\sqrt{3} = \tfrac{8}{27}R^3\sqrt{3} = \tfrac{1}{12}a^3\sqrt{2} = \tfrac{1}{36}b\sqrt{2b\sqrt{3}}.$$
$$R = 3r = \tfrac{1}{4}a\sqrt{6} = \tfrac{1}{4}\sqrt{2b\sqrt{3}} = \tfrac{3}{2}\sqrt[3]{\tfrac{1}{3}c\sqrt{3}}.$$
$$r = \tfrac{1}{3}R = \tfrac{1}{12}a\sqrt{6} = \tfrac{1}{12}\sqrt{2b\sqrt{3}} = \tfrac{1}{2}\sqrt[3]{\tfrac{1}{3}c\sqrt{3}}.$$

See Hutton's Mensuration, p. 248, &c. 2d edition. See also the articles Regular and Bodies.

TETRAGON, in geometry, a quadrangle, or a figure having four angles. Such as a square, a parallelogram, a rhombus, and a trapezium.

TETRAGONAL. *a.* Four-square.

TETRAGONIA, in botany, a genus of the class icosandria, order pentagynia. Calyx three or five-parted; petalless; drupe inferior, with a three or eight-celled nut. Eight species; six natives of the Cape, one of Peru, one of New Zealand; some shrubby, some herbaceous.

TETRAGONOTHECA, in botany, a genus of the class syngenesia, order polygamia superflua. Receptacle chaffy, downless; calyx one-leafed, four-sided, four-parted. One species, a native of Virginia, with a rough stem; opposite acute leaves; one-flowered peduncle.

TETRAGRAMMATON. (τετραγραμματον.) A denomination given by the Greeks to the Hebrew name of God יהוה, Jehovah, because in the Hebrew it consists of four letters.

TETRAGYNIA. (τεσσαρες, four, and γυνη, a woman.) The name of an order, or secondary division in the 4th, 5th, 6th, 8th, and 13th classes in the Sexual System; consisting of plants which, to the classic character, whatever it is, add the circumstance of having four styles or female organs. Herb-paris and grass of parnassus furnish examples.

TETRAMNUS, in botany, a genus of the class diadelphia, order decandria. Keel very minute, concealed in the calyx; stamens alternately barren and fertile; stigma sessile, capitate. Two species, both natives of Jamaica; one a twining shrub, with legumes hooked at the end, and ovate-lanceolate, pubescent leaflets.

TETRANDRIA. (τεσσαρες, four, and ανηρ, a man or husband.) The name of the fourth class in Linnéus's Sexual System, consisting of plants with hermaphrodite flowers, which have four stamina or male organs that are of equal length. In this last circumstance consists the main difference, according to Linnéus, between the plants of the class in question, and those of the 14th class didynamia, in which the four stamina are of unequal length, two of them being long, and two short.—The orders of this numerous class are three, founded upon the number of styles or female organs.

TETRANTHUS, in botany, a genus of the class syngenesia, order polygamia aggregata. Calyx five-leaved, four-flowered; calycle one-leaved, oblique; florets all hermaphrodite; receptacle naked; seeds crowned with the ciliate margin of the calyx. One species only, tetranthus littoralis, a native of Hispaniola, with creeping stem, roundish ovate leaves, and axillary solitary peduncles.

TETRAO, in zoology, a genus of the class aves, order gallinæ. Near the eyes a spot which is either naked or papillous, or rarely covered with feathers. Seventy-three species, divided into the following tribes.

A. Grous. Spot over the eyes naked; legs downy; feet in some four, in some three-toed.

B. Partridge, and quail. Orbits granulated; legs naked. The partridges, in the male, armed with a spur at the legs; the quails characterised by being destitute of spur.

C. Tinamon. Orbits with a few feathers; legs naked, four-toed, unarmed.

We shall give a few examples from each tribe.

1. T. Urogallus. Wood grous. Cock of the wood. Tail rounded; armpits white. Inhabits the mountainous and woody parts of Europe and northern Asia, and found in our own country.

2. T. Tetrix. Black game. Black grous. Violet-black; tail forked; secondary quill-feathers white towards the base.

ϵ. Another variety, varied with black and white; breast with a large shining black spot.

γ. Dirty white and pale-waved rusty; bill black; legs rusty.

δ. Hybrid; tail forked, beneath spotted with white. Inhabits mountainous and woody parts of England and Europe at large.

3. T. Scoticus. Red grous. Red game. Moor-cock. Moor-fowl. Transversely streaked with rufous and blackish; six outer tail-feathers on each side blackish.

4. T. Lagopus. Ptarmigan. White game. Cinereous; toes downy; quill-feathers white; tail-feathers black, tipt with white, the middle ones white. Inhabits the Alpine parts of Europe and Siberia; from fourteen to fifteen inches long; is stupid, and burrows under the snow; eggs pale-rufous with red brown spots.

5. T. Cupido. Pinnated grous. Back of the neck with supplemental wings. Bill black; irids hazel; body tawny, waved with black and white; head crested. Female, without the supplemental wings. Inhabits North America; less than a partridge; feeds on acorns and the leaves of the ralmia latifolia, whence it has occasionally proved poisonous at Philadelphia. The male, at sun-rise, erects his neck-wings, and sings for the space of half an hour.

6. T. alchata. Pin-tailed grous or ganga. Varied with olive, yellowish, black and rufous; belly white, two middle tail-feathers twice as long as the rest, subulate.

7. T. Perdix. Common partridge. Under the eyes a naked scarlet spot; tail ferruginous; breast brown; legs white.

Five other varieties.

β. Greyish-white.

γ. Entirely white.

δ. Collar white.

ε. Body brown.

ζ. Chin and upper part of the throat tawny. Inhabits Europe and Asia: thirteen inches long; frequents corn-fields and pastures; feeds on green-corn, seeds, and insects; lays from fourteen to eighteen greenish-grey eggs.

8. T. rufus. Greek or red partridge. Bill and legs blood-red; chin white, surrounded by a black band spotted with white. Inhabits southern Europe and the Greek islands. Another variety, with the feathers of the sides with a single black stripe; tail-feathers sixteen, the outer five on each side rufous; found occasionally on the Norfolk and Suffolk coasts, and called red-legged partridge.

A third variety with a chesnut collar, with white round spots: called Barbary partridge.

9. T. coturnix. Common quail. Body spotted with grey; eye-brows white; tail-feathers with a ferruginous edge and crescent.

Another variety of a much larger size.

Inhabits the whole of the old world; seven and a half inches long; migrates, and feeds on corn; calls nearly all night long; eggs whitish, with irregular rusty spots.

10. T. Virginianus. Virginian quail. Above and beneath the eyes a black band; crown with a tawny line. Inhabits the woods of America; perches on trees; somewhat less than the common partridge.

11. T. kakelik. Bill, eye-brows, and legs scarlet; breast cinereous; back waved white and cinereous. Inhabits China and Songoria; size of the pigeon; is named from its note, which resembles the word *kakelik*.

12. T. major. Great tinamon. Legs yellowish-brown; bill black; crown rufous; body olive; back and tail with black spots. Inhabits the woods of South America; eighteen inches long; roosts on the lower branches of trees; feeds on worms, insects, seeds, and fruits; builds twice a year at the root of a large tree, and lays from twelve to fifteen green eggs.

All these are properly called game. The cock of the wood is two feet eight or nine inches in length; and the weight of the male, which is considerably larger than the female, is from twelve to fifteen pounds. The two sexes differ greatly in colour as well as in size. The head, neck, and back of the male are elegantly marked with slender lines of grey and black, running transversely. The upper part of the breast is a rich shining green; the rest of the breast and the belly are black, mixed with some white feathers. At the insertion of the wing there is a large white spot, and the inner coverts are of the same colour. The tail, consisting of eighteen feathers, is black, with a few white spots on each side of the feathers. The female is red on the throat. Her head, neck, and back, are marked with bars of red and black: her belly is of an orange-colour, and the tail ferruginous, and barred with black. Length twenty-five or twenty-six inches.

The cock of the wood differs from all the rest of the genus, in his predilection for woods, and perching upon trees; particularly upon the pine, birch, and juniper. He feeds on the tops of the two former, and on the berries of the latter. To this food, in his wild state, he adds plants, vegetables, and eggs of ants; the last being the principal support of the young. The cock of the wood is found throughout the higher woodlands of Europe and northern Asia; on the Alps, Pyrenees, and the high mountains of Switzerland, Italy, and Greece more especially. From these mountainous retreats he sometimes ventures down in summer, to make depredations on the corn fields. Then, however, he is so shy and suspicious, that he never can be taken.

These birds never pair. At the season of love, which continues from March till the trees are covered with leaves and the forest is in full bloom, the male is seen perched upon a pine, where he moves backward and forward, calling upon the females. His head, upon these occasions, is swollen and red; his wings hanging, and his neck stretched forward. His cry begins with a loud full sound, which is followed by a noise, like that of the whetting of a scythe. By this singular language, which is heard and understood at a great distance, all the females in the neighbourhood are collected around the foot of the tree; from the top of which the male descends, and joins their society.

During the continuance of this cry, which continues for about an hour, the bird, as if stunned by its own noise or absorbed in his own feelings, is altogether insensible. Although at other times the most shy of all birds, yet, while in this kind of extacy, all his faculties seem suspended; and neither the approach of man, nor the discharge of a fowling-piece, can make him remove from the spot. Insensible to every danger, he falls an easy prey to his transports and the stupefying strength of his desires.

The female of this species lays from eight to sixteen eggs, which are white, and marked with yellow, and of the size of those of a common hen. During incubation, when she leaves them to search for food, she carefully covers them over with moss; so that they are but rarely found. Though as timorous and shy, on other occasions, as the male, she is, at this season, so tame, and deeply interested in her charge, that she will sit till actually dragged from the nest; her affection for her offspring thus effacing every dread of danger.

Next to this species, in point of size, is the black-game or black-cock; the male weighing about four pounds, and measuring from twenty-two to twenty-four inches. The plumage of the whole body is black, glossed over with a shining blue. The female, which is not much above half the size of the male, differs also in colour; all her plumage being marked with bars of red, nearly resembling the colour of the partridge. They are found in the woody and mountainous parts of Europe, especially in the north of Scotland. The young males, at the approach of winter, assemble together in flocks, when they fight with the fury of game cocks, and often kill each other. The victors mount upon a little eminence, where they strut about, proclaiming their triumph, with cries, and repeated claps of their wings. At these times, they are so insensible to all danger, that, during their engagements, several may be killed with one shot.

The red-grous or moor-cock inhabits the heaths of Scotland and the northern mountains of England and Wales: eggs reddish, with deeper spots of red. The red-game is smaller than the black-game.

The ptarmigan is the smallest of the rough or woolly-legged game; feeds on insects, berries, and tender shoots of trees; runs swiftly, and is impatient of sun and wind. Found plentifully on the highest mountains, and most frequently in the north of Scotland.

This bird is alleged by Buffon to acquire its pure winter white in consequence of the cold alone. Frisch corroborates this opinion of Buffon, asserting, that no white ptarmigans are seen during summer. Its feet are covered with a kind of down, below as well as above; whence it is termed lagopede by the French naturalist and Pliny. Of all the grous kind, the ptarmigan is the most shy, and least susceptible of domestication. The other species of game have frequently been tamed, if not domesticated; but, so far as we can learn, the ptarmigan has baffled every effort of this kind.

These different species are all easily distinguished from the birds of the poultry kind, by a naked skin, of a scarlet colour, above the eyes, in the place and of the figure of eye-brows. The roughness of their legs and feet is another distinguishing character. It seems, like the fur upon the foot of the hare, intended by nature as clothing, to defend them from the rigour of the winter. The ptarmigans are farther provided with broad and hollow nails, by which they are enabled to form a lodge under the snow, where they are said to lie in heaps, to protect themselves against the cold. On the Pyrenees, and in Syria, there is a species of grous, smaller than the ptarmigan, of a yellow olive colour, mixed with black and brown.

The pin-tailed grous or ganga, thirteen and a half inches long, found in southern Europe, differs remarkably from the grous kind common in the rest of Europe. It seems to be a gregarious bird: has long wings, and a rapid flight; and, in its tail, two feathers, that far exceed the rest in length. The female is nearly of the same size, but less vivid in her plumage. There are several other species, or rather varieties, belonging to this genus. M. Brisson mentions no less than twelve, including the ptarmigan. Among these are the brown spotted moor-fowl of Hudson's Bay, the larger and smaller grous of Canada, and the ruffed heath-cock of America.

The species found in Scotland is always described by foreign naturalists as peculiar to that country. It is described by Brisson under the name of *la gelinote d'Ecosse*, and was sent to M. Reaumur by the earl of Morton.

The most common species of the partridge are the grey and the red. The former seems to frequent Britain alone or nearly so. The latter abound in the mountainous and woody parts of the south of Europe, and sometimes perch upon trees. A variety of it has been found on the Norfolk coast. Some species or other of this tribe is found all over the world; the partridge, it would seem, having the power of accommodating itself to every climate. It is traced in Brasil, Mexico, and the different regions of North America. In the old continent, from Senegal to Greenland, different kinds are enumerated by the naturalists. In the latter country, the partridge, which is brown in summer, as soon as the frosts set in assumes, like the ptarmigan, a plumage suited to the climate. It is, at that season, covered below with a thick and warm down, and the external feathers are white like the snow among which it seeks for food.

The males of this tribe are more numerous than the females; and all the species agree in being immoderately salacious; whence arise a strong attachment to their young, and violent animosities among themselves. During the harvest and winter months, the different families live peaceably together; but no sooner does the spring approach than the males engage in the most obstinate battles, which often prove fatal; nor is peace restored till they separate in pairs, for the purpose of multiplying their kind.

The address of these birds in preserving their eggs and their young is no less remarkable. Whenever a dog or any other adversary approaches the nest, the female draws him away, by continuing to flutter before him. She then pretends to be almost incapable of flying, and hops before him at sufficient distance to be free from danger, yet not so far as to discourage his pursuit. At length, when she has thus drawn him entirely away from her secret treasure, she takes her full flight, and leaves him to gaze after her in despair. When the young are first excluded, the same artifice is said to be put in practice by the male, while the female remains squat over her brood. Of all the birds of this genus, the common partridge is the most concupiscent. Aristotle, who had an opportunity of examining the manners of these birds, mixes the marvellous so strongly with his narrative, that little dependance can be had on his testimony. He asserts, that the female may be fecundated by the cries of the male; by his flying over her; and even by the wind, if impregnated with particles that escape from his body. By these extravagances no more can be collected than that the female bartavelle, like the common hen, will lay unfecundated eggs without any intercourse with the male.

This species is remarkably prolific; a provision of nature, without which the ill-fated race, surrounded, as it continually is, by a thousand enemies, must have long since been annihilated. The hen produces annually from fifteen to twenty eggs, resembling those of a pigeon. Seldom, however, does a whole brood arrive at its adult state. The eggs are the food of some birds; the young are devoured by others; and man, the most formidable enemy of all, begins systematically to destroy them, as soon as the shooting season commences, which is nearly as early as the young are capable of flying, and long before they are capable of subsisting by themselves.

Nearly allied to the partridge, and of the same genus, is the quail: it is, however, much inferior in size, being only seven and a half inches long. The feathers of the head are black, edged with a rusty brown. The hind part of the neck, and crown of the head, are divided by a long pale yellow line: the breast is of a yellowish red, spotted with black: the scapular feathers and those upon the back are marked in their middle with a pale yellow line, and, on their sides, with ferruginous and blackish bars.

The quail is excellent game, and is more universally spread over the old continent than any of the other kinds. It is found in every country from the Cape of Good Hope to Iceland and Tartary. Its flesh is fat, juicy, and nutritive, and is every where deemed a delicate dish in modern times. The ancients, however, entertained a prejudice against its flesh, from a belief that it fed upon hellebore and was subject to epilepsy.

Quails are to be taken by calls, while in their wooing-time, which is from April till August; the quail will call at sun-rising, about nine o'clock, about twelve, about three in the afternoon, and at sun-set. The notes of the cock differ much from the hen, so that you should be expert in both; when you hear the cock call, answer in the hen's note; and so on the contrary, answer the hen in the cock's note, when they will both come to you, and you may cast your net over and take them.

If it be a single cock quail, he will come at the first call, but if he have a hen with him, he will not forsake her: sometimes you will only hear one answer your call, yet three or four will come to your net, so that you need not make too much haste when you find one entangled, for some more may be taken in a short time.

Quails are neat cleanly birds, and will not much run into dews or wet places, but choose rather to fly, that they may not dirty themselves; you must therefore at such times place yourself as near your nets as possible, and if by accident the quail pass by one end of the net, call her back again, and she will soon return.

The quail is a bird of passage, whose migrations have been the subject of much disquisition among the naturalists. In most countries of Europe, it appears in the month of May; and takes its departure about the beginning of September for the continent of Africa. The cause of their migration is not the cold, which they are able to support, as has been found by repeated experiments; but a deficiency of those plants and insects upon which they feed. They are frequently seen crossing the Mediterranean to Africa in September, and returning in the spring to Europe. In this long journey they are often so fatigued that they alight upon the rigging of vessels, and are caught by the sailors. At these times they are found in vast numbers in Egypt, and around the coast of the Red sea; those districts lying in the route in which they then fly, between Africa and the northern parts of Europe and Asia. In some parts of England, and in the south of Spain and Italy, the quail remains the whole year: the winter in these places not being so severe as to destroy entirely those insects upon which they feed. In Kent and Essex, when the frost and snow oblige them to quit the stubble fields of the midland counties, they are seen retreating to the shore, and feeding among the sea-weeds.

The fertility of the quail depends on the warmth of the climate where he resides. In England the female lays only six or seven eggs; in France and Italy above twice that number; and it is rare that any of them are addled by incubation.

Quails are endowed with a courage proportioned to the strength of their amorous instincts. Like the grous and partridges, they engage in contests with each other. Quail-fighting was as common at Athens, as cock-fighting is with us; and considerable sums were staked on the event of a battle. This diversion was also in high estimation at Rome; for we find in the time of Augustus a prefect of Egypt punished with death, for having served up at an entertainment one of these birds, which had acquired celebrity from its many victories. In some towns of modern Italy, the amusement is still in fashion.

Of the tinamons there are only five known species: they are all South American birds, and indigenous to Cayenne and Guiana. They vary in size from nine to eighteen inches; some of them build their nests on the branches of trees, others at the bottoms upon their roots.

TETRAPETALOUS COROL. (*tetrapetala corolla.*) In botany, a four-petalled corol. Consisting of four distinct petals: as in the class tetradynamia.

TETRAPHIS, in botany, a genus of the class cryptogamia, order musci. Capsule oblong; fringe simple, of four pyramidal, erect, distinct teeth. One species only, tetraphis pellucida, a native of our own country.

TETRAPHYLLOUS CALYX, in botany. A four-leaved calyx. Consisting of four distinct leaves, or leaflets, as Linnéus calls them. Exemplified in sagina, epimedium, and the class tetradynamia.

TETRAPOLIS, a name given to the city of Antioch, the capital of Syria, because it was divided into four separate districts, each of which resembled a city.

TETRARCH, a prince who holds and governs a fourth part of a kingdom. Such originally was the import of the title tetrarch; but it was afterwards applied to any petty king or sovereign; and became synonymous with ethnarch, as appears from the following considerations: 1. That Pliny makes mention of six tetrarchies within the city of Decapolis. 2. That Herod's kingdom was only divided into three parts, which yet were called tetrarchies, and the sovereigns thereof, Luke iii. 1. tetrarchs. 3. Josephus tells us, that, after the battle of Philippi, Antony, going into Syria, constituted Herod tetrarch; and on medals the same Herod is called ethnarch.

TETRA′RCHATE. TETRA′RCHY. *s.* (τετραρχια.) A Roman government of a fourth part of a province.

TETRASPERMOUS PLANT. A four-seeded plant. Producing four seeds in each flower: as in the asperifoliæ and verticillatæ.

TETRASTYLE, in the ancient architecture, a temple or other building having four columns in its front.

TETRATHECA, in botany, a genus of the class octandria, order monogynia. Calyx five-cleft, inferior; corol four-petalled; anthers four-celled; capsule two-celled, two-valved; the valves bearing the partitions in the middle; seeds about two. One species only, tetratheca juncea, a New Holland plant, with alternate lanceolate leaves, and acute-angled stem.

TETRATOMA, in zoology, a genus of the class insecta, order coleoptera. Antennas clavate, the clubs perfoliate; lip rounded, entire; feelers thickish, unequal; shells as long as the abdomen. Two species; inhabitants of Germany on tree-funguses.

TETRATONON, the name by which the Greek musicians distinguished the interval now called the superfluous fifth.

TETRICAL. TE′TRICOUS. *a.* (*tetricus*, Lat.) Froward; perverse; sour (*Knolles*).

TETRODON. Sun-fish. In zoology, a genus of the class pisces, order branchiostega. Jaws bony, extending, divided at the end; aperture of the gills linear; body muricate beneath; without ventral fin. Fourteen species, scattered through the waters of the globe; two common to our own coasts. We shall select a few examples.

1. T. sceleratus. Quadrangular; head very large. Inhabits the American and Pacific oceans; from two to two and a half feet long; flesh poisonous.

2. T. lineatus. Lineated tetragon. Body with longitudinous brown and pale stripes. Inhabits the Nile, and grows to a vast size; if handled when just taken out of the water, its prickles sting the skin, and produce small pustules like the nettle. Body square, without scales, but prickly on the back, punctured beneath, and smooth on the sides; above blueish-green, beneath reddish-yellow, the sides blueish-brown with four stripes on each side, the two upper ones curved, the third divided like the letter V, and the lowest white.

3. T. electricus. Electric tetrodon. Spotted with red, green, and white; above brown, beneath sea-green, the sides yellow; fins green. Inhabits St. John's Island in holes of coral rocks: seven inches long: gives a kind of electric shock when handled.

4. T. ocellatus. Ocellate tetrodon. Before the dorsal fin a black ocellate band. Inhabits the fresh waters of China and Japan, and the neighbouring seas; body thick, spherical; above dusky-green, beneath white; prickly on the breast and belly. This fish is so exceedingly poisonous as if eaten to destroy life in a few hours: whence the emperor of Japan prohibits his soldiers from tasting it under severe penalties. Rumphius asserts that the symptoms may be cured by the timely administration of a vegetable which he calls rex amaroris, but of which we know nothing farther.

5. T. lævigatus. Globe tetrodon, or sun-fish. Belly dilatable, and prickly before the anal fin. Inhabits Europe and Carolina, and found on our own coasts.

6. T. mola. Unarmed, smooth, compressed, oblong; tail very short, anal and dorsal fins connnected; spiracles crescent-shaped. Inhabits European and Mediterranean seas, and is the oblong sun-fish of our own coasts.

Another variety, unarmed, rough, compressed, rounded; tail very short and rounded;

dorsal and anal fins connected; sphericles oval. Inhabits with the last, and is the short sun-fish of our own shores.

The globe sun-fish is seldom a visitor of the British coast; one, however, of the species was taken at Penzance in Cornwall. Its more common residence is off the shores of Carolina. It is of an oblong shape, of a foot and eight inches in length; the length of the globular belly, when extended, is above one foot, and its circumference, when in that state, is above two. This singular power of inflating its belly, till it acquires a globular shape of such magnitude, seems to have been intended by nature as the defence of this animal; it is then of a size less easily laid hold of by its enemies, whilst the great number of spines with which its belly is surrounded renders it an object of terror.

The globe, upon the back, is of a rich deep blue; the sides and belly are white, shagreened or wrinkled, and beset with innumerable small spines, each attached to the skin by four processes. It has two pectoral fins; a dorsal one far back behind the globe, and opposite to that an anal fin.

The oblong sun-fish differs from the former, not only in wanting the globe, but in being much shorter: it resembles a carp, or some thick fish cut through by the middle. It often grows to a very amazing size; some having been taken of five hundred pounds weight: yet it is commonly little more than two feet in length; so that the thickness, to afford nearly such a weight, must be very much disproportioned to the animal's length.

The body of this species is black above, and dappled; below silvery; it wants scales, but is covered with a thick, hard, and rough skin. The mouth is small for the size of the fish; between it and the eyes there are two apertures for the nostrils; but there are several other orifices in the head, the use of which has never been ascertained by any naturalist, though Willoughby supposes that two of them correspond to the organs of hearing in other animals.

The pectoral fins are placed immediately behind the eyes; they are small, and of a roundish shape; the dorsal and anal fins are placed high, and at the very extremity of the body; the tail fin is semicircular, and fills up the whole abrupt space between them.

The short sun-fish is a still more awkward figure than the oblong; it is shorter and thicker, having the anal and dorsal fins set still higher, which gives the body a more abrupt appearance. The flesh of both is rank and unsavoury: when boiled, it turns into a kind of jelly, resembling boiled starch after it is cold; and from experiments made upon leather and paper, it has been found to answer the purposes of glue.

TETTER, called by farriers the flying-worm, or ring-worm. It runs up and down the skin in different directions, from whence it receives its name. It is most commonly found on the rump, and runs down the joints of the tail; and if neglected is said to turn into a canker. It will now and then settle upon some fleshy part of the body, which will be attended with so troublesome an itching, as to make the horse rub against walls and posts, till he will bring away the hair and skin, and even tear his flesh with his teeth, if he can come at it. After all, however, this disease differs little, if at all, from the mange, and is to be cured by similar means.

TETTER, in human medicine. See HERPES.

TETTIGONIA, in the entomology of Fabricius, a tribe of the genus CICADA, which see.

TETTNANG, a town of Suabia, and the principal place of a lordship of the same name. It is eight miles N. of Lindau, and 18 E.N.E. of Constance. Lon. 9. 50 E. Lat. 47. 46 N.

TETUAN, a city of the kingdom of Fez, with a castle. The houses have only little holes toward the streets to look out at; for the windows are on the inside, toward the court-yard, which is surrounded by galleries; and in the middle is generally a fountain. The houses are two stories high, flat at the top, and the streets very narrow. The women visit each other from the tops of their houses: they wear bracelets on their arms and legs, and large ear-rings; have very fine eyes, and some of them beautiful skins; and their vest is open before, from the bosom to the waist. The shops are very small, and without doors, the master sitting crosslegged on a counter, with the goods disposed in drawers round him, and all the customers stand in the street. It is seated on the river Cus, three miles from the Mediterranean, 21 S. of Ceuta, and 108 N. by W. of Fez. Lon. 5. 26 W. Lat. 35. 27 N.

TEUCER, a king of Phrygia, son of Scamander by Idea. His country was called Teucria. His daughter married Dardanus, who succeeded him.—2. A son of Telamon, king of Salamis, by Hesione, the daughter of Laomedon. He was one of Helen's suitors, and accordingly accompanied the Greeks to the Trojan war, where he signalized himself. His father refused to receive him into his kingdom, because he had left the death of his brother Ajax unrevenged. He left Salamis, and retired to Cyprus, where, with the assistance of Belus king of Sidon, he built a town, which he called Salamis, after his native country. He attempted to no purpose to recover the island of Salamis after his father's death. He built a temple to Jupiter in Cyprus, on which a man was annually sacrificed till the reign of the Antonies.

TEUCRIUM. Germander. Speedwell. In botany, a genus of the class didynamia, order gymnospermia. Upper lip of the corol divided below the base and divaricate; stamens projecting from the fissure of the upper lip. Sixty-four species, scattered over the globe; three common to the walls, woods, or marshes of our own country. The following are cultivated.

1. T. flavum. Yellow-flowered shrubby germander.

2. T. scorodonia. Sage-leaved germander, or wood-sage.

3. T. canadense. Nettle-leaved germander.

4. T. montanum. Dwarf-mountain germander.

5. T. Pyrenaicum. Pyrenean germander.

6. T. polium. Poley germander.

7. T. capitatum. Round-headed germander. Poley-mountain of Montpellier.

8. T. pumilum. Dwarf germander.

9. T. fruticans. Narrow-leaved germander.

10. T. latifolium. Broad-leaved germander.

11. T. Creticum. Cretan germander. Poley-mountain of Crete.

12. T. marum. Common marum, or cat-thyme.

13. T. chamæpitys. Common ground-pine, formerly employed under the name of chamæpitys in medicine as a roborant. See CHAMÆPITYS.

14. T. scordium. Water germander: also employed in medicine formerly under the name of scordium, on account of its bitter and pungent properties. See SCORDIUM.

15. T. chamædrys. Officinal germander: employed in medical practice formerly under its specific name in intermittent fevers, gout, and rheumatism. See CHAMÆDRYS.

16. T. marum. Marum germander: also used formerly in medicine as an aromatic, and still in favour with the continental practitioners. See MARUM.

The germanders, properly so called, may be propagated either by seeds or cuttings. The seeds should be sown in April, upon a bed of light earth, and in autumn following the plants may be transplanted to the places in which they are designed to remain. If the season proves dry, let them be watered till they have taken fresh root, after which they will require no other care but to keep the ground clean about them, and to keep their heads regular, by taking off such shoots as are ill situated. The cuttings should be planted in the spring, on a bed of fresh light earth, and watered till they have taken root; let them be kept clear from weeds. In the following autumn they may be transplanted to the places in which they are to remain, and afterwards treated like the seedling plants.

The different sorts of polium may be propagated by seeds, which must be procured from the countries where they naturally grow, because they seldom ripen their seeds in this country. These should be sown upon a bed of fresh light earth in the spring. When the plants come up, they must be carefully kept clean from weeds, and about the middle of July they should be transplanted upon a warm border of dry soil, observing to shade them from the sun, and to water them till they have taken new root; after which they will require no other culture but to be kept clean from weeds. They may also be propagated by cuttings or slips, which should be planted the beginning of April, upon a border exposed to the east; they must be shaded and watered, if the season proves dry, till they have taken root, after which they will require no care but to keep them clean from weeds till Michaelmas, when they should be removed to the places in which they are designed to remain.

The several sorts of chamædrys found in the gardens may be propagated by parting of the roots in autumn, or by sowing of the seeds at the same season; the plants should have a dry soil, and a warm situation.

The different sorts of chamæpitys cultivated among us may be raised by sowing the seeds in autumn. If the seeds are permitted to scatter, the plants will come up better than if sown, and will require no care but to thin them, and keep them free from weeds.

The marum is a native of Syria, and the kingdom of Valencia. It is a plant very common with us in the gardens of the curious, and is propagated by planting cuttings in any of the summer months, on a bed of fresh light rich earth, where they are to be carefully watered and shaded till they have taken root; after which they may be removed either into pots or borders. But the greatest difficulty attending the keeping this plant is the preserving it from cats, which will come a great way, and tear it to pieces. It is observed, however, that though these animals never spare a plant that grows single, they will not meddle with it when planted in large clusters, which is indeed the only way to save it.

The scordium is a native of England, and is increased by parting of the roots, or by cuttings or slips, which should be planted in March, upon beds of moist earth, at the distance of four or five inches asunder, observing to water them well till they have taken root, after which they will require no farther care than to be kept clean of weeds.

TEVERONE, a river of Italy, the ancient Anio, which rises in the Apennines, 50 miles above Tivoli, glides through a plain till it comes near that town, when it is confined for a short space between two hills, covered with groves. These were supposed to be the residence of the sibyl Albunea, to whom a temple here was dedicated, the elegant form of which indicates its having been built when the arts were in the highest state of perfection. The river moving with augmented rapidity, as its channel is confined, at last rushes violently over a lofty precipice; the noise of its fall resounds through the hills and groves of Tivoli; a liquid cloud arises from the foaming water, which afterwards divides into numberless small cascades. Having gained the plain, it soon afterward receives the waters of the lake Solfatara, and flows quietly on till it loses itself in the Tiber. See SOLFATARA.

TEVIOT, a river of Scotland, which rises in the mountains in the S.W. of Roxburghshire, and passing almost through the centre of that county, unites with the Tweed, near Kelso.

TEVIOTDALE. See ROXBURGHSHIRE.

TEUSCHNITZ, a town of Franconia, in the bishopric of Bamberg, 34 miles N.E. of Bamberg. Lon. 11. 27 E. Lat. 59. 22 N.

TEUSERA, a town of Barbary, in Biledulgerid, divided into two parts by a river. It stands on the confines of Tunis, in a country abounding in dates. Lon. 10. 16 E. Lat. 31. 28 N.

TEUTHIS, in zoology, a genus of the class pisces, order abdominalia. Head truncate on the fore-part; gill-membrane five-rayed; teeth equal, rigid, approximate, in a single row. Two species: teuthis hepatus, with a recumbent moveable spine on each side the tail, body blueish, back black; inhabiting Carolina and Amboina: and teuthis Java, with tail unarmed, and body marked with longitudinal blackish spots; an inhabitant of Java.

TEUTONES, or TEUTONI (anc. geog.), a people always by historians joined with the Cimbri; both seated, according to Mela, beyond the Elbe, on the Sinus Codanus, or Baltic; and there, it is supposed, lay the country of the Teutones, now *Ditmarsh*; diversity of dialects producing the different terms *teut*, *tut*, *dit*, *tid*, and *thod*, which in the ancient German language signified *people*. Of these Teutones, Virgil is to be understood in the epithet *Teutonicus*, an appellation which more lately came to be applied to the Germans in general, and later still the appellation *Alemanni*. The Teutones, in conjunction with the Cimbri and Ambrones, made war on the Romans, and marched towards Italy in the year 101 B. C. We are told, that the Teutones alone were so numerous, that they were six whole days without intermission in passing by the Roman camp. In Transalpine Gaul they engaged the Roman consul Marius, but were defeated with incredible slaughter; 100,000 of them, according to the lowest calculations, being killed on the spot. According to others, the number of those killed and taken prisoners amounted to 290,000. The inhabitants of the neighbouring country made fences for vineyards of their bones. Their king Teutobochus, said to be a monstrous giant, was taken prisoner and carried to Rome. See the article GIANT.

TEUTONIC, something belonging to the Teutones. The Teutonic language is supposed to have been the language of the ancient Germans, and hence is reckoned amongst the mother-tongues.

TEUTONIC ORDER, an order of military knights, established towards the close of the 12th century.

TEW. *s.* (*towe*, a hempen rope, Dutch.) 1. Materials for any thing (*Skinner*). 2. An iron chain (*Ainsworth*).

To TEW. *v. a.* (ꞇaƿian, Sax.) To work; to beat so as to soften.

TE'WEL. *s.* (*tuyau*, or *tuyal*, French.) The taper pipe fixed in the back of a forge, into which is placed the bellows (*Moxon*).

TEWKESBURY, a borough in Gloucestershire, with a market on Wednesday and Saturday. Here are the ruins of a monastery; and it was formerly famous for mustard balls, to which Shakspeare alludes in his second part of Henry IV. It has manufactures of woollen cloths and cotton stockings, and sends two members to parliament. Here, in 1471, Edward IV. gained a decisive victory over the Lancastrians. Tewkesbury is seated at the confluence of the Severn and Avon, 10 miles N. of Gloucester, and 102 W.N.W. of London. Lon. 2. 13 W. Lat. 52. 0 N.

TE'WTAW. *v. a.* (from *tew*, by reduplication.) To beat; to break (*Mortimer*).

TEXEL, an island of N. Holland, separated from the continent by a narrow channel of the same name, defended by a strong fort on the mainland, called the Helder. This channel is the best and most southern entrance into the Zuider Zee, and through it most of the ships pass that are bound to Amsterdam. In 1799, the fort was taken by the English; and the whole of the Dutch fleet, lying within the channel, surrendered to them; but the English abandoned the fort soon afterward. Lon. 4. 59 E. Lat. 53. 10 N.

TEXT. *s.* (*textus*, Lat.) 1. That on which a comment is written (*Waller*). 2. A sentence of scripture (*South*).

TE'XTILE. *a.* (*textilis*, Lat.) Woven; capable of being woven (*Wilkins*).

TE'XTMAN. *s.* (*text* and *man*.) A man ready in quotation of texts (*Sanderson*).

TE'XTRINE. *a.* (*textrina*, Lat.) Relating to weaving (*Derham*).

TE'XTUARIST. TE'XTUARY. *s.* (*textuaire*, Fr.) One ready in the text of scripture; a divine well versed in scripture.

TE'XTUARY. *a.* (from *text*.) 1. Contained in the text (*Brown*). 2. Serving as a text; authoritative (*Glanville*).

TE'XTURE. *s.* (*textus*, Latin.) 1. The act of weaving (*Brown*). 2. A web; a thing woven (*Thomson*). 3. Manner of weaving with respect either to form or matter (*Pope*). 4. Disposition of the parts of bodies; combination of parts (*Newton*).

TEWIT, in ornithology. See TRINGA.

TEZAR, a town of the kingdom of Fez, capital of the province of Cuzi. Here is a mosque half a mile in circumference. It is seated on a small river, 45 miles E. of Fez. Lon. 4. 15 W. Lat. 33. 40 N.

TEZZOUTE, a town of Algiers, in the province of Constantia. Its ruins extend 10 miles in circumference, among which are magnificent remains of city gates, an amphitheatre, a temple dedicated to Esculapius, and other elegant structures. It is 90 miles S.S.W. of Constantia.

THABOR. See TABOR.

THÆLÆPHORA, in botany, a genus of the class cryptogamia, order fungi. Fungus corky, warty, and bearing the fructification underneath. Twelve species; natives of our own country; grey-brown, greyish-white, rich orange, or saffron.

THAIS, a famous courtezan of Athens, who accompanied Alexander to the Asiatic conquests, and gained such an ascendancy over him, that she made him burn the royal palace of Persepolis. After Alexander's death, she married Ptolemy king of Egypt.

THALASSIUS, a beautiful young Roman in the reign of Romulus. At the rape of the Sabines, one of these virgins appeared remarkable for beauty and elegance, and her ravisher, afraid of many competitors, exclaimed as he carried her away, that she was for Thalassius. All were eager to preserve so beautiful a prize for him. Their union was attended with so much happiness, that it was ever after usual at Rome to make use of the word Thalassius at nuptials, and to wish those that were married the felicity of Thalassius. He is supposed by some to be the same as Hymen, as he was made a deity.

THALAMI NERVORUM OPTICORUM. (θαλαμος, a bed.) Two bodies, which form in part the optic nerve, placed near to each other, in appearance white, protruding at the base of the lateral ventricles, and running in their direction inwards, a little downwards, and upwards.

THALAMUS, in botany. See RECEPTACLE.

THALES, in biography, a celebrated Greek philosopher, and the first of the wise men of Greece, born at Miletum about 640 years before the Christian era. When he had acquired the usual learning of his country, he travelled into Asia and Egypt, to be instructed in geometry, astronomy, and natural philosophy. On his return he became a teacher of youth, and among his disciples, which were numerous, were Anaximander, Anaximenes, and Pythagoras. Thales was the author of the Ionian sect of philosophers; he was reckoned, by the best historians, the father of Greek philosophy, being the first that made any researches into natural knowledge and mathematics. He thought water was the principle of which all bodies in the universe are composed: that the world was the work of God, whom he regarded as omniscient, and beholding the secret thoughts in the heart of man. He maintained that real happiness consisted in health and knowledge: that the most ancient of beings is God, because he is uncreated: that nothing is more beautiful than the world, because it is the work of God; nothing more extensive than space, quicker than spirit, stronger than necessity, wiser than time. He used to observe, that we ought never to say that to any one which may be turned to our prejudice; and that we should live with our friends as with persons that may become our enemies. In geometry he was a considerable inventor, as well as an improver, particularly in triangles; and all the writers agree, that he was the first, even in Egypt, who took the height of the pyramids by the shadow. His knowledge and improvements in astronomy were very considerable. He divided the celestial sphere into five circles or zones; the arctic and antarctic circles, the two tropical circles, and the equator. He observed the apparent diameter of the sun, which he made equal to half a degree; and formed the constellation of the Little Bear. He observed the nature and course of eclipses, and calculated them exactly; one in particular, memorably recorded by Herodotus, as it happened on a day of battle between the Medes and Lydians, which Thales had foretold; and he divided the year into 365 days. He died at the age of ninety years, leaving behind him an excellent character, as a mathematician, a philosopher, and moralist.

THALESTRIA, or THALESTRIS, a queen of the Amazons, who came 35 days journey to meet Alexander in his Asiatic conquests, to raise children by a man whose fame was so great, and courage so uncommon.

THALIA, one of the Muses, who presided over festivals, pastoral and comic poetry. She is represented leaning on a column, holding a mask in her right hand, by which she is distinguished from her sisters, as also by a shepherd's crook. Her dress appears shorter, and not so ornamented as that of the other Muses.

THALIA, in botany, a genus of the class monandria, order monogynia. Calyx three-leaved; corol five-petalled, the two interior ones less; nectary lanceolate, concave; drupe with a one-celled nut. One species only, thalia geniculata, a South American plant, from the stem of which the Indians make their lances.

THALICTRUM. Meadow-rue. In botany, a genus of the class polyandria, order polygamia. Calyxless; petals four or five; seeds without tails. Twenty-three species; chiefly natives of Europe, a few of Asia and America: the four following indigenous to our own country.

1. T. alpinum. Alpine meadow-rue. Stalk very simple; simple terminal raceme.

2. T. majus. Larger meadow-rue. With drooping flowers; found on our bushy hills.

3. T. minus. Lesser meadow-rue. With panicled, drooping flowers; found in our pastures.

4. T. flavum. Common or yellow meadow-rue; with erect flowers. Found in our meadows: the rhabarbarum pauperum of the old dispensatories. The root is said to be aperient and stomachic, and to approach in those respects the virtues of rhubarb.

One or two of these, and several of the exotic sorts, are cultivated in our gardens.

THAME, or TAME, a river which rises near Tring, in Hertfordshire, crosses Buckinghamshire to the N. of Ailesbury, enters Oxfordshire at the town of Thame, whence it is navigable for barges to Dorchester, where it joins the Thames. This river has been erroneously supposed to give name to the Thames.

THAME, a town in Oxfordshire, with a market on Tuesday, seated on the river Thame, 12 miles E. of Oxford, and 44 W. by N. of London.

THAMES, the finest river in Great Britain, which takes its rise from several copious springs, lying between Cirencester, Stow, and Cheltenham in Gloucestershire. It has been erroneously said that its name is Isis, till it arrives at Dorchester, 15 miles below Oxford, when, being joined by the Thame or Tame, it assumes the name of Thames. What was the origin of this vulgar error, cannot now be traced: poetical fiction, however, has perpetuated this error, and invested it with a kind of classical sanctity. But Camden says, that the river was always called Thames or Tems, before it came near the Thame: and in several ancient charters granted to the abbey of Malmesbury, as well as that of Ensham, and in the old deeds relating to Cricklade, it is never considered under any other name than that of Thames. All the historians, who mention the incursions of Ethelwold, and of Canute, into Wiltshire, concur likewise in the same opinion, by declaring, that they passed over the Thames at Cricklade in Wiltshire. About a mile below the source of the river, it is not more than nine feet wide in the summer, yet in the winter becomes such a torrent, as to overflow the meadows for many miles. The stream proceeds to Cricklade, where it receives many other rivulets, which causes it to widen considerably in its way to Lechlade; and being there joined by the Coln and Lech, at the distance of 138 miles from London, it becomes navigable for vessels of 90 tons. At Oxford (in whose academic groves its poetical name of Isis has been so often invoked) it is joined by the Charwell, and proceeding by Abingdon to Dorchester, it receives the Thame. Passing by Wallingford to Reading, and forming a boundary to Berkshire, Buckinghamshire, Surry, and Middlesex, it waters Henley, Marlow, Maidenhead, Windsor, Staines, Chertsey, Kingston, and Brentford, in its course to London; during which it receives the Kennet, Loddon, Coln, Wey, Mole, Brent, and Wandle. From London the river proceeds to Greenwich, Woolwich, Grays-Thurrock, Gravesend, and Leigh, into the German ocean, in which course it parts Essex from Kent, and receives the Lea, Roding, Darent, and Medway. The tide flows up the Thames as high as Kingston, which, following the winding of the river, is 70 miles from the ocean; a greater distance than the tide is carried by any other river in Europe. Though the Thames is said to be navigable 138 miles above London bridge, there are so many flats, that, in summer, the navigation westward would be stopped, were it not for a number of locks; but the first lock is 52 miles above that bridge. The plan of new cuts has been adopted, in some places, to shorten the navigation; there is one near Lechlade, and another a mile from Abingdon. A still more important undertaking was effected in 1789; the junction of this river with the Severn. A canal had been made, from the Severn to Stroud; which canal is now continued to Lechlade, where it joins the Thames; a distance of above 30 miles. A communication between this river and the Trent and Mersey has likewise been effected, by a canal from Oxford to Coventry; and another canal extends from this, at Braunston, to the Thames at Brentford, called the Grand Junction Canal.

Thames, a river of Connecticut, formed of two principal branches, the Shetucket and the Norwich, or Little River, which have their junction at Norwich. From this place the Thames is navigable 15 miles to Long Island sound, which it enters below New London.

THAMYRAS, or **Thamyris**, a celebrated musician of Thrace. His father's name was Philammon, and his mother's Argiope. He was conquered, in a trial of skill, by the Muses, who deprived him of his eyesight and his melodious voice, and broke his lyre. His poetical compositions are lost. Some accused him of having first introduced into the world the unnatural vice of which Sodates is accused.

THAN. *ad.* (ðanne, Saxon.) A particle placed in comparison after the comparative adjective: as, *I am older* than *you*.

THANE. *s.* (ðeȝn, Saxon.) An old title of honour, perhaps equivalent to baron (*Shakspeare*). See below.

Thane, or **Thain**, **Thanus**, the name of an ancient dignity among the English, or Anglo-Saxons.

Skene makes thane to have been a dignity equal with that of the son of an earl: Camden will have it, that thanes were only dignified by the offices which they bore.

There were two kinds or orders of thanes: the king's thanes, and the ordinary thanes. The first were those who attended our English-Saxon kings in their courts, and who held lands immediately of the king: whence in Domesday-book, they are promiscuously called *thani*, and *servientes regis*.

Soon after the Conquest, this name was disused; and instead thereof they were called the king's barons, *barones regis*.

Their origin is referred to king Canutus, who, taking the chief of the Danish nobility, to the number of three thousand, for his guard, and arming them with battle-axes and sabres with gilt handles, called them *thing lith*, from the two Danish words *theing* or *thein*, body of nobility, and *lith*, order of battle.

The ordinary thanes, or *thani minores*, were the lords of manors, who had particular jurisdiction within their limits, and over their own tenants.

These changed their name for that of barons; and hence their courts are called courts baron to this day.

In old authors, charters, &c. we also meet with thane as signifying a nobleman; though sometimes only a freeman, and sometimes a magistrate.

Thane lands, were lands granted by charter of the Saxon kings to their thanes.

THANET, an island comprising the E. angle of Kent, being separated from the mainland by the two branches of the Stour. It produces much corn, and the S. part is a rich tract of marsh land. It contains the towns of Margate and Ramsgate, and several villages.

To **THANK.** *v. a.* (ðancian, Sax.) 1. To return acknowledgments for any favour or kindness (*Dryden*). 2. It is often used in a contrary or ironical sense (*Swift*).

Thank. Thanks. *s.* (ðancaſ, Saxon.) Acknowledgment paid for favour or kindness; expression of gratitude (*Shakspeare*).

THA'NKFUL. *a.* (ðancꝼul, Saxon.) Full of gratitude; ready to acknowledge good received (*Dryden*).

THA'NKFULLY. *ad.* With lively and grateful sense of good received (*Boyle*).

THA'NKFULNESS. *s.* (from *thankful.*) Gratitude; lively sense or ready acknowledgment of good received (*Taylor*).

THA'NKLESS. *a.* (from *thank.*) 1. Unthankful; ungrateful; making no acknowledgment (*Pope*). 2. Not deserving, or not likely to gain thanks (*Crashaw*).

THA'NKLESSNESS. *s.* Ingratitude; failure to acknowledge good received (*Donne*).

THANKO'FFERING. *s.* (*thank* and *offering.*) Offering paid in acknowledgment of mercy (*Watts*).

THANKSGI'VING. *s.* (*thanks* and *give.*) Celebration of mercy (*Hooker*).

THA'NKWORTHY. *a.* (*thank* and *worthy.*) Deserving gratitude; meritorious (*Davies*).

THAPSIA, in botany, a genus of the class pentandria, order digynia. Fruit oblong, with four membranaceous wings, the lateral ones very large. Five species; four natives of the Levant, one of Virginia. The roots of thapsia fœtida were formerly employed as a spasmodic in medicine, but they have long fallen into disuse.

THARM. *s.* (ðeaꞃm, Sax. *darm*, Dutch, the gut.) Intestines twisted for several uses.

THASIUS, or Thrasius, a famous soothsayer of Cyprus, who told Busiris, king of Egypt, that, to stop a dreadful plague which afflicted his country, he must offer a foreigner to Jupiter. Upon this the tyrant ordered him to be seized and sacrificed to the god, as he was not a native of Egypt. *Ovid.*—A sirname of Hercules, who was worshipped at Thasos.

THASOS, or Thasus, a small island in the Ægean, on the coast of Thrace, opposite the mouth of the Nestus, anciently known by the name of Æria, Odonis, Æthria, Acte, Ogygia, Chryse, and Ceresis. It received that of Thasos from Thasus the son of Agenor, who settled there when he despaired of finding his sister Europa. It was about 40 miles in circumference, and so uncommonly fruitful, that the fertility of Thasos became proverbial. This island still bears the same name, as well as its chief town, which has a harbour frequented by merchants. Lon. 24. 32 E. Lat. 40. 59 N.

THAT. *pronoun.* (*thata*, Gothic; ðæt, Saxon; *dat*, Dutch.) The plural of *that*, when it is demonstrative, is *these*; as, *that* man is good, and *these* are mending. When it is relative, it has no plural; as, the men *that* helped me, are men *that* my father favoured. 1. Not this, but the other: *take this, and give me* that. 2. Which; relating to an antecedent thing: *the house* that *was fired.* 3. Who; relating to an antecedent person: *the man* that *spoke.* 4. It sometimes serves to save the repetition of a word or words foregoing; *he is grieved, and* that *deeply.* 5. Opposed to *this*, as *the other* to *one.* 6. When *this* and *that* relate to foregoing words, *this* is referred like *hic* or *ceci* to the latter, and *that* like *ille* or *cela* to the former. 7. Such as (*Tillotson*). 8. That which; what (*Shakspeare*). 9. The thing: that *which I say is this.* 10. The thing which then was (*Cowley*). 11. By way of eminence (*Cowley*). 12. *In* That. Because (*Hooker*).

That. *conjunction.* 1. Because: *I am sorry* that *I cried.* 2. Noting a consequence: *he was so frighted* that *he fled.* 3. Noting indication: *show* that *he can stand.* 4. Noting a final end: *work* that *they may live.*

THATCH. *s.* (ðace, Sax. straw. *Skinner.*) Straw laid upon the top of a house to keep out the weather (*Watts*).

To Thatch. *v. a.* (ðaccian, Sax.) To cover as with straw (*Dryden*).

THA'TCHER. *s.* (from *thatch.*) One whose trade is to cover houses with straw (*Swift*).

THAUMATURGUS, formed from θαυμα, wonderful thing, and εργον, work, worker of miracles; an appellation which the Romanists give to several of their saints, eminent for the number and greatness of their miracles. St. Gregory, called Thaumaturgus, or Gregory of Neocæsarea, was a disciple of Origen, about the year 223, and afterwards bishop of Cæsarea in Pontus; and in that capacity he assisted at the first council of Antioch, and at that of Ephesus, against Paulus Samosatenus. St. Leo of Catanea is also called Leo Thaumaturgus. He lived in the eighth century; and his body is still honoured at Rome in the church of St. Martin de Tours. St. Francis Paul, and St. Francis Xavier, are the great Thaumaturgi of these last ages.

To THAW. *v. n.* (ðaƿan, Saxon; *degen*, Dutch.) 1. To grow liquid after congelation; to melt (*Boyle*). 2. To remit the cold which had caused frost.

To Thaw. *v. a.* To melt what was congealed (*Shakspeare*).

Thaw. *s.* (from the verb.) 1. Liquefaction of any thing congealed (*Milton*). 2. Warmth, such as liquefies congelation (*Shakspeare*).

THAXTED, a town in Essex, with a market on Friday. It has a large and beautiful church, and is seated near the source of the Chelmer, 20 miles N. by W. of Chelmsford, and 44 N.N.E. of London.

THE. *article.* (*de*, Dutch.) 1. The article noting a particular thing (*Shakspeare*). 2. Before a vowel *e* is commonly cut off in verse (*Daniel*). 3. Sometimes *he* is cut off (*Cowley*).

THEA. Tea-tree. In botany, a genus of the class polyandria, order monogynia. Calyx five or six-leaved; petals from six to nine; style trifid; capsule three-celled, with a single seed in each. Two species.

1. T. bohea. Bohea-tea. Flowers with

six petals: in one variety the leaves elliptic-oblong, wrinkled; in another lanceolate, flat. A native of China and Japan. A shrub evergreen, branched; the leaves alternate, obtusely serrate, emarginate; petioles short, gibbous underneath, flattish above; flowers white, two or three together, axillary; calyx and petals roundish.

The Chinese frequently substitute the leaves of the camellia sasanqua for the leaves of the tea-tree, but they may easily be detected by the flowers, and the leaves not being slightly notched at the end, and the petioles not being gibbous underneath.

2. T. viridis. Green-tea. The flowers of this species have nine petals. It is a native of Japan. Thunberg differs from Linnéus, and makes this only a variety of the preceding species. The height to which these trees grow varies considerably. If left to themselves they would probably ascend thirty or forty feet, but they are usually cut down when they have risen six or seven feet, that they may make stronger shoots.

This plant delights in valleys, and is frequent on the sloping sides of mountains and the banks of rivers, where it enjoys a southern exposure. It flourishes in the northern latitudes of Pekin as well as round Canton; but attains the greatest perfection in the mild temperate regions of Nankin. It is said only to be found between the 30th and 45th degrees of north latitude. In Japan it is planted round the borders of fields, without regard to the soil; but as it is an important article of commerce with the Chinese, whole fields are covered with it, and it is by them cultivated with care. The abbe Rochen says, it grows equally well in a poor as in a rich soil; but that there are certain places where it is of a better quality. The tea which grows in rocky ground is superior to that which grows in a light soil, and the worst kind is that which is produced in a clay soil. It is propagated by seeds; from six to twelve are put into a hole about five inches deep, at certain distances from each other. The reason why so many seeds are sown in the same hole is said to be, that only a fifth part vegetate. Being thus sown, they grow without any other care. Some, however, manure the land, and remove the weeds; for the Chinese are as fond of good tea, and take as much pains to procure it of an excellent quality, as the Europeans do to procure excellent wine.

The leaves are not fit for being plucked till the shrub is of three years' growth. In seven years it rises to a man's height; but as it then bears but few leaves, it is cut down to the stem, and this produces a new crop of fresh shoots the following summer, every one of which bears nearly as many leaves as a whole shrub. Sometimes the plants are not cut down till they are ten years old. We are informed by Kæmpfer, that there are three seasons in which the leaves are collected in the isles of Japan, from which the tea derives different degrees of perfection.

The first gathering commences at the end of February or the beginning of March. The leaves are then small, tender, and unfolded, and not above three or four days old: these are called ficki tsiaa, or tea in powder, because it is pulverised; it is also called imperial tea, being generally reserved for the court and people of rank; and sometimes also it is named bloom tea. It is sold in China for 20*d.* or 2*s.* per pound. The labourers employed in collecting it do not pull the leaves by handfuls, but pick them up one by one, and take every precaution that they may not break them. However long and tedious the labour may appear, they gather from four to ten or fifteen pounds a day. The second crop is gathered about the end of March or beginning of April. At this season part of their leaves have attained their full growth, and the rest are not above half their size. This difference does not, however, prevent them from being all gathered indiscriminately. They are afterwards picked and assorted into different parcels, according to their age and size. The youngest, which are carefully separated from the rest, are often sold for leaves of the first crops, or for imperial tea. Tea gathered at this season is called too tsiaa, or Chinese tea, because the people of Japan infuse it, and drink it after the Chinese manner.

The third crop is gathered in the end of May, or in the month of June. The leaves are then very numerous and thick, and have acquired their full growth. This kind of tea, which is called ben tsiaa, is the coarsest of all, and is reserved for the common people. Some of the Japanese collect their tea only at two seasons of the year, which correspond to the second and third already mentioned: others confine themselves to one general gathering of their crop, towards the month of June: however, they always form afterwards different assortments of their leaves.

An infusion of tea is the common drink of the Chinese; and indeed, when we consider one circumstance in their situation, we must acknowledge that Providence has displayed much goodness in scattering this plant with so much profusion in the empire of China. The water is said to be unwholesome and nauseous, and would therefore, perhaps, without some corrective, be unfit for the purposes of life. The Chinese pour boiling water over their tea, and leave it to infuse as we do in Europe; but they drink it without any mixture, and even without sugar. The people of Japan reduce theirs to a fine powder, which they dilute with warm water, until it has acquired the consistence of thin soup. Their manner of serving tea is as follows. They place before the company the tea equipage, and the box in which this powder is contained; they fill the cups with warm water, and take from the box as much powder as the point of a knife can contain, throw it into each of the cups, and stir it with a toothpick until the liquor begins to foam; it is then presented to the company, who sip it while it is warm. According to Du

Halde, this method is not peculiar to the Japanese; it is also used in some of the provinces of China.

The first European writer who mentions tea is Giovanni Botero, an eminent Italian author, who published a treatise about the year 1590, of the causes of the magnificence and greatness of cities. He does not indeed mention its name, but describes it in such a manner that it is impossible to mistake it. "The Chinese," says he, "have a herb out of which they press a delicate juice, which serves them for drink instead of wine; it also preserves their health, and frees them from all those evils which the immoderate use of wine produces among us." Tea was introduced into Europe in the year 1610 by the Dutch East India Company. It is generally said, that it was first imported from Holland into England, in 1666, by the lords Arlington and Ossory, who brought it into fashion among people of quality. But it was used in coffee-houses before this period, as appears from an act of parliament made in 1660, in which a duty of 8*d.* was laid on every gallon of the infusion sold in these places. In 1666 it was sold in London for 60*s.* per pound, though it did not cost more than 2*s.* 6*d.* or 3*s.* 6*d.* at Batavia. It continued at this price till 1707. In 1715 green tea began to be used; and as great quantities were then imported, the price was lessened, and the practice of drinking tea descended to the lower ranks. In 1720 the French began to send it to us by a clandestine commerce, Since that period the demand has been increasing yearly, and it has become almost a necessary of life in several parts of Europe, and among the lowest as well as the highest ranks.

The following table will give an idea of the great quantity of tea imported annually into Great Britain and Ireland since 1717.

From	1717 to 1726	-	700,000 *lbs.*
	1732 to 1742	-	1,200,000
	1755 near	-	4,000,000
	1766	- -	6,000,000
	1785 about	-	12,000,000
	1794 from 16 to		20,000,000

Besides these immense quantities imported into Britain and Ireland, much has been brought to Europe by other nations. In 1766 the whole tea imported into Europe from China amounted to 17 millions of pounds; in 1785 it was computed to be about 19 millions of pounds. In this country teas are generally divided into three kinds of green, and five of bohea: the former are, 1. Imperial or bloom tea, with a large loose leaf, light green colour, and a faint delicate smell. 2. Hyson, so called from the name of the merchant who first imported it; the leaves of which are closely curled and small, of a green colour, verging to a blue. 3. Singlo tea, from the name of the place where it is cultivated. The boheas are, 1. Souchong, which imparts a yellow green colour by infusion. 2. Camho, so called from the place where it is made; a fragrant tea, with a violet smell; its infusion pale. 3. Congo, which has a larger leaf than the preceding, and its infusion somewhat deeper, resembling common bohea in the colour of the leaf. 4. Pekoe tea; this is known by the appearance of small white flowers mixed with it. 5. Common bohea, whose leaves are of one colour. There are other varieties, particularly a kind of green tea, done up in roundish balls, called gunpowder-tea.

THEAKI, an island in the Mediterranean sea, 24 miles long and seven broad, separated from the N.E. part of that of Cefalonia by a narrow channel. It is the ancient Ithaca, celebrated as the birthplace and kingdom of Ulysses. It forms part of the republic of Seven Islands, and the chief town is Valthi, which has a spacious harbour. Lon. 20. 40 E. Lat. 38. 25 N.

THEANDRIC, ϑεανδρικος, *dei-virile*; a term signifying divine and human, formed from Θεος, God, and ανηρ, man.

St. Dionysius, bishop of Athens, first used the word theandric, to express a double operation, or two operations united in Jesus Christ; the one divine, the other human. The Monophysites afterwards abused it, to signify the one only operation which they admitted in Jesus Christ; in whom they believed there was a mixture of the divine and human nature, whence resulted a third nature, which was a compound of the one and the other, whose operations followed the essence and qualities of the mixture, and were neither divine nor human, both at once, or, in one word, theandric.

Θεανδρικη ενεργεια, theandric, or dei-virile operation, in the sense of Dionysius, and Damascenus, is thus exemplified by Athanasius. When Christ healed the person who was born blind, the spittle he voided was human, but the opening of the eyes was done by his divine power. And thus, in raising Lazarus, he called as man, but awaked him from the dead as God.

The term theandric, and the dogma of theandric operations, were examined with great care and attention, at the council of Lateran, held in 649, where pope Martin solidly refuted the notion of theandric operations, and shewed that the sense wherein St. Dionysius first used the word was catholic, and quite remote from that of the Monophysites and Monothelites.

THEANTHROPOS. (Θεανθροπος, formed from Θεος, God, and ανθρωπος, man, denominated God-man.) A term sometimes used in the schools, to signify Jesus Christ, who is God-man; or represented by many scholastic theological writers, as comprehending two natures in one person.

THE'ATRAL. *a.* (*theatral*, Fr. *theatralis*, Latin.) Belonging to a theatre.

THEATRE, a place in which shows or dramatic representations are exhibited.

For the origin of the dramatic art we always turn our eyes to Greece, the nursery of the arts and sciences. It may indeed have been known among more ancient nations, but no records remain sufficient to support this opinion. The different states of Greece asserted their claim to the honour of having given it birth, but the account of the Athenians is most generally received. It derived its origin from the hymns which were sung in the festivals of Bacchus in honour of that deity. While these resounded in the ears of the multitude, choruses of Bacchants and Fauns, ranged round certain obscene images which they carried in triumphal procession, chanted lascivious songs, and sometimes sacrificed individuals to public ridicule.

This was the practice in the cities; but a still greater licentiousness reigned in the worship paid to the same divinity by the inhabitants of the country, and especially at the season when they gathered the fruits of his beneficence. Vintagers, besmeared with wine-lees, and intoxicated with joy and the juice of the grape, rode forth in their carts, and attacked each other on the road with gross sarcasms, revenging themselves on their neighbours with ridicule, and on the rich by publishing their injustice.

Among the poets who flourished at that time, some celebrated the great actions and adventures of gods and heroes, and others attacked with asperity the vices and absurdities of individuals. The former took Homer for their model, and supported themselves by his example, of which they made an improper use. Homer, the most tragic of poets, the model of all who have succeeded him, had in the Iliad and the Odyssey brought to perfection the heroic poem, and in his Margites had employed pleasantry. But as the charm of his works depends in a great measure on the passions and motion with which he knew to animate them, the poets who came after him endeavoured to introduce into theirs an action which might excite emotion or mirth in the spectators: some even attempted to produce both, and ventured certain rude essays, which have since been styled indifferently either tragedies or comedies, because they unite the characters of these two dramas. The authors of these sketches have been distinguished by no discovery; they only form in the history of the art a succession of names which it would be useless to recal to light.

The necessity and power of theatrical interest was already known. The hymns in honour of Bacchus, while they described his rapid progress and splendid conquests, became imitative; and in the contests of the Pythian games, the players on the flute who entered into competition, were enjoined, by an express law, to represent successively the circumstances that had preceded, accompanied, and followed the victory of Apollo over Python.

Some years after this regulation, Susarion and Thespis, both born in a small borough of Attica, named Icaria, appeared each at the head of a company of actors, the one on a kind of stage, the other in a cart. The former attacked the vices and absurdities of his time; and the latter treated more noble subjects, which he took from history.

The comedies of Susarion were in the same taste with those indecent and satirical farces which were afterwards performed in some of the cities of Greece. They were long the favourite entertainment of the country people. Athens did not adopt this species of exhibition until after it was brought to perfection in Sicily.

Thespis had more than once seen in the festivals, in which as yet hymns only were sung, one of the singers, mounted on a table, form a kind of dialogue with the chorus. From this hint he conceived the idea of introducing into the tragedies an actor who, by simple recitals introduced at intervals, should give relief to the chorus, divide the action, and render it more interesting. This happy innovation, together with some other liberties in which he had allowed himself, gave alarm to the legislator of Athens, who was more able than any other person to discern the value or danger of the novelty. Solon condemned a species of composition in which the ancient traditions were disguised by fictions. "If we applaud falsehood in our public exhibitions (said he to Thespis), we shall soon find that it will insinuate itself into our most sacred engagements."

The excessive approbation and delight with which both the city and country received the pieces of Thespis and Susarion, at once justified and rendered useless the suspicious foresight of Solon. The poets, who till then had only exercised their genius in dithyrambics and licentious satire, struck with the elegant forms which this species of composition began to assume, dedicated their talents to tragedy and comedy. Soon after a greater variety was introduced in the subjects of the former of these poems. Those who judge of their pleasures only from habit, exclaimed, that these subjects were foreign to the worship of Bacchus; but the greater number thronged with still more eagerness after the new pieces.

Phrynichus, the disciple of Thespis, made choice of that kind of verse which is most suitable to the drama, was the author of some other changes, and left tragedy in its infancy.

Æschylus received it from his hands enveloped in a rude vestment, its visage covered with false colours, or a mask inexpressive of character, without either grace or dignity in its motions, inspiring the desire of an interest which it with difficulty excited, still attached to the buffooneries which had amused its infant years, and expressing its conceptions sometimes with elegance and dignity, but frequently in a feeble and low style, polluted with gross obscenities.

In his first tragedies he introduced a second actor; and afterward, copying the example of Sophocles, who had just entered on his theatrical career, he admitted a third, and sometimes even a fourth. By this multiplicity of personages, one of his actors became the hero of the piece, and attracted to himself the principal interest; and as the chorus now held only a subaltern station, Æschylus took care to shorten its part, and perhaps even carried this precaution too far.

He is censured for having admitted mute characters into his drama. Achilles, after the death of his friend, and Niobe, after the destruction of her children, appear on the stage and remain during several scenes motionless, with their heads covered with a veil, and without uttering a word; but if their eyes had overflown with tears, and they had poured forth the bitterest lamentations, could they have produced an effect so terrible as this veil, this silence, and this abandonment to grief?

It was not sufficient that the noble and elevated style of tragedy should leave in the minds of the auditors a strong impression of grandeur; to captivate the multitude, it was requisite that every part of the spectacle should concur to produce the same effect. It was then the general opinion that nature, by bestowing on the ancient heroes a more lofty stature, had impressed on their persons a majesty which procured them as much respect from the people as the ensigns of dignity by which they were attended. Æschylus therefore raised his actors on high stilts or buskins. He covered their features, which were frequently disagreeable, with a mask that concealed their irregularity. He clothed them in flowing and magnificent robes, the form of which was so decent, that the priests of Ceres have not blushed to adopt it. The inferior actors were also provided with masks and dresses suited to their parts.

Instead of those wretched scaffolds which were formerly erected in haste, he obtained a theatre furnished with machines, and embellished with decorations. Here the sound of the trumpet was reverberated, incense was seen to burn on the altars, the shades of the dead to arise from the tomb, and the furies to rush from the gulphs of Tartarus. In one of his pieces these infernal divinities appeared, for the first time, with masks of a horrid paleness, torches in their hands, serpents intertwined in their hairs, and followed by a numerous retinue of dreadful spectres. It is said, that at the sight of them, and the sound of their terrific howlings, terror seized on the whole assembly, women miscarried, and children expired with fear; and that the magistrates, to prevent similar accidents in future, commanded that the chorus should consist only of fifteen actors instead of fifty.

The effect of so many new objects could not but astonish the spectators; nor were they less surprised and delighted at the intelligence displayed in the performance of the actors, whom Æschylus almost always exercised himself. He regulated their steps, and taught them to give additional force to the action by new and expressive gestures.

The progress of the art was extremely rapid. Æschylus was born 525 years before Christ, 11 years after Thespis had acted his Alcestis. He had for competitors Chœrilus Pratenas, and Phrynichus, whose glory he eclipsed, and Sophocles, who rivalled his own. Sophocles was born about the year 497 B. C. about 14 years before Euripides. These carried tragedy to the highest perfection to which it attained among the Greeks. Æschylus painted men greater than they can be, Sophocles as they ought to be, and Euripides as they are.

Invented towards the 50th Olympiad (about 580 B. C.), and adapted to the rude manners of the rustics, comedy ventured not to approach the capital; and if by chance some companies of actors, who were unconnected with any others, found their way into the city, and performed their indecent farces, they were less authorised than tolerated by the government. It was not till after a long infancy that this species of drama began suddenly to make a rapid improvement in Sicily. Instead of a succession of scenes without connexion or tendency, the philosopher Epicharmus introduced an action, all the parts of which had a dependence on each other; and conducted his subject, without wandering from it, through a just extent to a determinate end. His pieces, subjected to the same laws as tragedy, were known in Greece, where they were considered as models; and comedy soon shared with her rival the suffrages of the public, and the homage due to genius. The Athenians, especially, received her with the same transports as they would have testified at the news of a victory: many of their poets exercised their genius in this novel species of composition; and their names adorn the numerous lists of writers who have been distinguished in comedy from the time of Epicharmus. Such were, among the more ancient, Magnes, Cratinus, Crates, Pherecrates, Eupolis, and Aristophanes. They all flourished in the age of Pericles.

If we peruse the comic pieces which have come down to us, we shall be convinced that the sole object of the authors was to please the multitude. The gods and heroes were travestied, gross and obscene language was often employed, and virulent invectives were often thrown out against individuals of the first rank for genius and virtue. Towards the end of the Peloponnesian war the licentiousness of comedy was restrained. The chorus was laid aside, because the rich citizens were alarmed, and would no longer contribute money to support it, nor provide masks with portraits for exposing individuals.

The poets being thus restrained from mentioning names of living persons on the stage, invented false names. They still exposed real and known characters; and thus gave a more exquisite gratification to the spectators, who were highly amused with finding out the persons intended. The consequence of the law was only to make that done with delicacy, which was formerly done in the most indecent and scurrilous manner. Aristophanes, in some of his latest pieces, has given us some good examples of this kind of comedy, which is sometimes called the middle comedy.

Comedy was still liable to abuse, and therefore required farther reformation. As the use of real names had formerly been prohibited, real subjects were also forbidden; and comedy from that time was no longer a fury armed with torches, or a firebrand scattering mischief, but a pleasing and instructive companion. This is called the new comedy. The most eminent among the Greeks in this improved species was Menander. His writings are now lost; but we may form a good estimate of their merit from the comedies of Terence, which are said to have been borrowed from Menander, and to have nearly resembled the original, though inferior in that *vis comica* by which the elegant Grecian was distinguished. The comedy of Menander is that which has been cultivated in modern times.

To give some idea of a Grecian theatre, we shall describe very shortly the theatre of Bacchus in Athens, which was built by the famous architect Philos in the time of Pericles. The part intended for the spectators was of a semicircular form, at the diameter of which was erected the stage. The orchestra occupied the space where the pit in modern theatres is situated, where the music, the chorus, and the mimi were placed. It was four feet elevated above the ground. The spectators were arranged in three galleries round all the sides of the orchestra, except that next the stage, each gallery containing eight rows of seats. At the farther end of the orchestra, where the stage is erected in modern theatres, stood the thymele or logion, but projecting a little towards the audience. It was a little higher than the orchestra, and did not extend the whole breadth of it. In some theatres it was only six feet square. Here the principal part of the chorus made their recitations, and in comical interludes the mimi performed. Behind the thymele appeared the stage or proscenion, considerably elevated. No part of this theatre was covered except the stage, and a high gallery called *circys*, set apart for the women. The Athenians, being exposed to the weather, came usually with great cloaks, to secure them from the rain or the cold; and for defence against the sun, they had the *sciadion*, a kind of parasol, which the Romans used also in their theatres by the name of *umbellæ*; but when a sudden storm arose, the play was interrupted, and the spectators dispersed.

A sort of tent work over the entire area of the edifice might have been contrived as a shelter from the rain and a shade from the sun. Such a covering would have obviated the inconveniences of roofed theatres, which obstruct the free communication of the air, and of unroofed theatres, which do not keep out the weather. At Athens the plays were always represented in the daytime, which made the unroofed theatres less inconvenient.

Plays were represented only during the three festivals solemnized in honour of Bacchus. The first of these was celebrated at the Piræus, where some of Euripides's pieces were first performed. The second, which lasted only one day, was kept at the end of January or beginning of February. The third, called the greater dionysia, was celebrated a month after. It continued several days, and attracted a great multitude of spectators. In the festivals which lasted only one day, five or six dramatic pieces, either tragedies or comedies, were performed. But in the greater dionysia, which continued longer, twelve or fifteen, and sometimes more, were acted. The performance began early in the morning, and sometimes lasted the whole day.

The chorus, according as the subject demanded, was composed of men and women, old men or youths, citizens or slaves, priests, soldiers, &c. to the number of fifteen in tragedy, and twenty-four in comedy. The chorus came upon the stage preceded by a flute-player, who regulated their steps; sometimes one after the other, but in tragedy more frequently three in front and five in depth, or five in front and three in depth.

The same persons performed both in tragedy and comedy; but, as among ourselves, it was rare to meet with any who excelled in both. The pay of those who had acquired great reputation was considerable. Polus gained a talent in two days (equal to 225*l.* sterling). Players of eminence were solicited by different actors of Greece to attend their festivals. If, after making an engagement, they failed, they were obliged to pay a certain sum of money; and if they were absent during the festivals of their own republic, they were condemned to a heavy fine.

The actors had habits and symbols suited to their parts. Kings wore a diadem, leaned on a sceptre which supported an eagle on its top, and were dressed in long robes of purple or other splendid colours, ornamented with gold. Heroes, besides having their stature frequently increased to six feet English, and their bulk in proportion, were frequently covered with the skin of a lion or a tiger, and armed with swords, quivers, and clubs. All who suffered misfortunes wore a black, brown, or dirty white garment, which frequently hung in tatters. There were various kinds of masks for tragedy, comedy, and satire. These certainly took away the pleasure arising from the expression of the countenance; but at any rate, little pleasure could be derived from this circumstance in a Grecian theatre, from its immense size, and the great distance of the audience from the stage.

Dramatic entertainments were introduced at Rome in the year of the city 391. They were called *ludi scenici*, because they were first acted in a shade formed by the branches and leaves of trees. They were borrowed immediately from Etruria, whence also they received their first players. These Etrurians at first only danced to a flute, without either singing or acting. The Roman youth soon imitated them at their solemn festivals, adding raillery in rude verses, and gestures adapted to the subject. These verses were called *fescennini*, from Fescennia, a city of Etruria. Livius Andronicus was the first poet who wrote a regular play in Latin. This happened in the year of Rome 512 or 514, about 160 years after the death of Sophocles and Euripides, and fifty-two after that of Menander. The Grecian model was afterwards introduced and cultivated much by succeeding dramatic writers. This was the model of Menander, for the old and middle comedy was unknown at Rome. As the Romans were only imitators of the Greeks in the dramatic art, as well as in most of the arts and sciences, nothing more is necessary to be said in addition to the account which we have already given of the Grecian stage.

The origin of the English stage is hid in obscurity. It was not, however, copied from the Grecian or Roman; for it was evidently different in form as well as in matter, and may with more propriety be deduced from a Gothic original. It appears that there were theatrical entertainments in England almost as early as the conquest; for we are told by William Stephanides or Fitz-Stephen, a monk, who in the reign of Henry II. wrote his Descriptio Nobilissimæ Civitatis Londoniæ, that London, instead of the common interludes of the theatre, had plays of a more holy kind; representations of the miracles of confessors, and the sufferings of martyrs. At this time there were also certain sets of idle people, who travelled the countries, and were called *mummers*; a kind of vagrant comedians, whose excellence consisted altogether in mimickry and humour.

It is probable that, soon after this time, the dramatic representations called mysteries were exhibited. These mysteries were taken from scripture history: some represented the creation of the world, with the fall of Adam and Eve; some the story of Joseph; and others even the incarnation and sufferings of the Son of God. These pieces were exhibited in a manner so ridiculous as to favour libertinism and infidelity, as appears by a petition of the chaunters of St. Paul's cathedral to Richard II. in 1378, praying that "some unexpert people might be prohibited from representing the history of the Old Testament to the prejudice of the said clergy, who had been at great expence to represent it publicly at Christmas."

In the year 1390, the parish clerks of London are said to have played interludes at Skinner's-well on three successive days in July; and in 1409, to have acted for eight days successively a play concerning the creation of the world, at the same place, which thence acquired the name of Clerkenwell.

These mysteries were succeeded by moralities, in which there were some rude traces of a fable and a moral; and some also of poetry, the virtues, vices, and other affections of the mind, being frequently personified.

After these moralities came what were called interludes, which made some approaches to wit and humour. Many of these pieces were written by John Heywood, jester to Henry VIII.

In the time of Henry VIII. one or two pieces had been published under the classical names of comedy and tragedy, but they appear not to have been intended for popular use. It was not till the religious ferments had subsided that the public had leisure to attend to dramatic poetry. In the reign of Elizabeth, tragedies and comedies began to appear in form, and could the poets have persevered, the first models were good. Gorboduc, a regular tragedy, was acted in 1561; and Gascoigne, in 1566, exhibited Jocasta, a translation from Euripides, as also The Supposes, a regular comedy, from Ariosto, near thirty years before any of Shakspeare's were printed.

The people, however, still retained a relish for their old mysteries and moralities, and the popular dramatic poets seem to have made them their models. The graver sort of moralities appear to have given birth to our modern tragedy; as our comedy evidently took its rise from the lighter interludes of that kind. And as most of these pieces contain an absurd mixture of religion and buffoonery, an eminent critic has well deduced from thence the origin of our unnatural tragi-comedies. Even after the people had been accustomed to tragedies and comedies, moralities still kept their ground. One of them, intitled The New Custom, was printed so late as 1573. At length they assumed the name of masques, and, with some classical improvements, became in the two following reigns the favourite entertainments of the court.

As for the old mysteries, which ceased to be acted after the reformation, they seem to have given rise to a third species of stage exhibition; which, though now confounded with tragedy or comedy, were by our first dramatic writers considered as quite distinct from them both: these were historical plays, or histories; a species of dramatic writing which resembled the old mysteries in representing a series of historical events simply in the order of time in which they happened, without any regard to the three great unities. These pieces seem to differ from tragedy just as much as historical poems do from epic: as the Pharsalia does from the Æneid. What might contribute to make dramatic poetry take this turn was, that soon after the mysteries ceased to be exhibited, there was published a large collection of poetical narratives, called the Mirror for Magistrates, wherein a great number of the most eminent characters in English history are drawn relating their own misfortunes. This book was popular, and of a dramatic cast; and therefore, as an elegant writer has well observed, might have its influence in producing historic plays. These narratives probably furnished the subjects, and the ancient mysteries suggested the plan.

That our old writers considered historical plays as somewhat distinct from tragedy and comedy, appears from numberless passages of their works. "Of late days (says Stow in his Survey of London), instead of those stage plays have been used comedies, tragedies, interludes, and histories, both true and fained." Beaumont and Fletcher, in the prologue to the Captain, say,

> "This is nor comedy, nor tragedy,
> "Nor history."——

Polonius, in Hamlet, commends the actors as the best in the world, either for tragedie, comedie, historie, pastorall, &c. And Shakspeare's friends, Heminge and Condell, in the first folio edition of his plays, in 1623, have not only intitled their book Mr. William Shakspeare's Comedies, Histories, and Tragedies, but, in their table of contents, have arranged them under those three several heads; placing in the class of histories, King John, Richard II. Henry IV. 2 parts, Henry V. Henry VI. 3 parts, Richard III. and Henry VIII.

This distinction deserves the attention of the critics: for if it be the first canon of sound criticism to examine any work by those rules the author prescribed for his first observance; then we ought to try Shakspeare's histories by the general laws of tragedy and comedy. Whether the rule itself be vicious or not, is another inquiry; but certainly we ought to examine a work only by those principles according to which it was composed. This would save much impertinent criticism.

Not fewer than nineteen playhouses had been opened before the year 1633, when Prynne published his Histriomastix. From this writer we learn that tobacco, wine, and beer, were in those days the usual accommodations in the theatre, as till lately at Sadler's Wells. With regard to the prices of admission, the playhouse called the Hope had five different priced seats, from sixpence to half-a-crown. Some houses had penny benches. The two-penny gallery is mentioned in the prologue to Beaumont and Fletcher's Woman Hater; and seats of threepence and a groat in the passage of Prynne last referred to. But the general price of what is now called the pit seems to have been a shilling. The time of exhibition was early in the afternoon, their plays being generally acted by daylight. All female parts were performed by men, no actress being ever seen on the public stage before the civil wars. And as for the playhouse furniture and ornaments, they had no other scenes nor decorations of the stage, but only old tapestry, and the stage strewed with rushes, with habits accordingly; as we are assured in a short Discourse on the English Stage, subjoined to Flecknoe's Love's Kingdom, 1674, 12mo. See also the articles COMEDY, DRAMA, PLAYHOUSE, TRAGEDY, &c.

THEA'TRIC. THEA'TRICAL. *a.* (*theatrum*, Latin.) Scenic; suiting a theatre; pertaining to a theatre (*Pope*).

THEA'TRICALLY. *ad.* (from *theatrical.*) In a manner suiting the stage (*Swift*).

THEBAIS, a country in the southern parts of Egypt, of which Thebes was the capital. There have been some poems which have borne the name of Thebais, but of these the only one extant is the Thebais of Statius. It gives an account of the war of the Thebans against the Argives. The poet was twelve years in composing it.

THEBES, THEBÆ (*arum*), a celebrated city, the capital of Bœotia, situate on the banks of the river Ismenus. Cadmus is supposed to have first began to found it by building the citadel Cadmea. It was afterwards finished by Amphion and Zethus, but according to Varro, it owed its origin to Ogyges. Its government was monarchical, and many of the sovereigns are celebrated for their misfortunes, such as Laius, Œdipus, Polynices, Eteocles, &c. The war which Thebes supported against the Argives is famous, as well as that of the Epigoni. The Thebans were looked upon as an indolent and sluggish nation, and the words *Theban pig* became proverbial to express a man remarkable for stupidity and inattention. This, however, was not literally true: under Epaminondas, the Thebans, though before dependent, became masters of Greece, and every thing was done according to their will and pleasure. When Alexander invaded Greece, he ordered Thebes to be totally demolished, except the house where the poet Pindar had been born and educated. Thebes was afterwards repaired by Cassander, the son of Antipater. The monarchical government was abolished there at the death of Xanthus, about 1190 years before Christ, and Thebes became a republic. It received its name from Thebe the daughter of Asopus, to whom the founder Amphion was nearly related.—2. An ancient and celebrated city of Thebais in Egypt, called also Hecatompylos, on account of its hundred gates, and Diospolis, as being sacred to Jupiter. In the time of its splendour, it extended above 23 miles, and upon any emergency could send into the field, by each of its hundred gates, 20,000 fighting men, and 200 chariots. Thebes was ruined by Cambyses, king of Persia. Three villages, named Carnack, Luxor, and Gournon, are seated among its ruins, which are hence called the antiquities of Carnack and Luxor.

THECA, in botany. See ARIL.

THECA VERTEBRALIS. (θηκη, from τιθημι, to place.) The vertebral canal.

THEE. The oblique singular of *thou.*

THEFT. *s.* (from *thief.*) 1. The act of stealing (*Cowell*). 2. The thing stolen (*Exodus*).

THEIR. *pro.* (ðeoꞃa, *of them*, Saxon.) 1. Of them: the pronoun possessive, from *they* (*Dryden*). 2. *Theirs* is used when any thing comes between the possessive and substantive (*Roscommon*).

THELEOBOLUS, in botany, a genus of the class cryptogamia, order fungi. Fungus sessile, gelatinous, solid, ejecting a membranous mass containing the seeds. One species only, theleobolus stercoreus, a native of our own country.

THELYGONUM. Dog's cabbage. In

botany, a genus of the class monœcia, order polyandria. Male: filaments twelve or more. Fem.: pistil one; capsule coriaceous, one-celled, one-seeded. One species, thelygonum cynocrambe, a native of Tartary and the East Indies, with trailing, flexuous stem; leaves ovate, rather obtuse, rough on the edge; male flowers two together, axillary, on short peduncles: female flowers solitary, sessile.

THEM. The oblique of *they*.

THEME. *s.* (*theme*, French, from ϑεμα.) 1. A subject on which one speaks or writes (*Roscommon*). 2. A short dissertation written by boys on any topic (*Milton*). 3. The original word whence others are derived (*Watts*).

THEMIS, a daughter of Cœlus and Terra, who married Jupiter against her own inclinations. She became mother of Dice, Irene, Eunomia, the Parcæ, &c. and was the first to whom the inhabitants of the earth raised temples. Her oracle was famous in Attica in the age of Deucalion, who consulted it with great solemnity, and was instructed how to repair the loss of mankind. She was generally attended by the seasons. Among the moderns she is represented as holding a sword in one hand, and a pair of scales in the other.

THEMISON, a famous physician of Laodicea, disciple to Asclepiades. He was founder of a sect called methodists, because he wished to introduce methods to facilitate the learning and the practice of physic. He flourished in the Augustan age. *Plin.*—2. One of the generals of Antiochus the Great. He was born at Cyprus.

THEMISTIUS, a celebrated philosopher of Paphlagonia in the age of Constantius, greatly esteemed by the Roman emperors, and called the fine speaker, from his eloquent and commanding delivery. He was made a Roman senator, and always distinguished for his liberality and munificence. His school was greatly frequented. He wrote, when young, some commentaries on Aristotle, fragments of which are still extant, and 33 of his orations. In his addresses to the emperors, he strongly recommends humanity, wisdom, and clemency.

THEMISTOCLES, a celebrated general, born at Athens: the son of Neocles and Euterpe, a native of Halicarnassus. The beginning of his youth was marked by vices so flagrant, that his father disinherited him. But the protection which he was denied at home he sought in courting the favours of the populace, and in having a share in the administration of public affairs. When Xerxes invaded Greece, Themistocles was at the head of the Athenian republic, and in this capacity the fleet was intrusted to his care. His naval operations and the combined fleet of the Peloponnesians were directed to destroy the armament of Xerxes, and to ruin his maritime power. The obstinate wish of the generals to command the Grecian fleet might have proved fatal to the interest of the allies, had not Themistocles freely relinquished his pretensions, and nominated his rival Eurybiades master of the expedition. The Persian fleet was distressed at Artemisium, by a violent storm, and the feeble attack of the Greeks; but it was owing to Themistocles that a decisive battle had ever been fought, for the Greeks, actuated by different views, were unwilling to make head by sea against the enemy; but Themistocles sent intelligence of their intentions to the Persian monarch. Xerxes, by immediately blocking them with his fleet in the bay of Salamis, prevented their escape, and obliged them to fight for their safety, as well as for the honour of their country. This battle, which was fought near the island of Salamis, B. C. 480, was decisive; the Greeks obtained the victory. Further to ensure the peace of his country, Themistocles informed the Asiatic monarch, that the Greeks had conspired to cut down the bridge which he had built across the Hellespont, and to prevent his retreat into Asia. Xerxes hastened away from Greece, left his forces without a general, and his fleets an easy conquest to the victorious Greeks. Themistocles was received with the most distinguishing honours, and by his prudent administration Athens was soon fortified with strong walls, her Pireus was rebuilt, and her harbours were filled with a numerous and powerful navy, which rendered her the mistress of Greece. Yet in the midst of that glory, the conqueror of Xerxes incurred the displeasure of his countrymen. He was banished from the city, and obliged to throw himself into the arms of a monarch whose fleets he had defeated, and whose father he ruined. Artaxerxes received the illustrious Athenian with kindness; made him one of his greatest favourites, and bestowed three rich cities upon him, to provide him with bread, wine, and meat. But Themistocles still remembered that Athens gave him birth, and according to some writers, the wish of not injuring his country, and therefore his inability of carrying on war against Greece, at the request of Artaxerxes, obliged him to destroy himself by drinking bull's blood. The manner of his death, however, is uncertain. His bones were conveyed to Attica, and honoured with a magnificent tomb by the Athenians, who began to repent too late of their cruelty to the saviour of his country. Themistocles died in the 65th year of his age, about 449 years before the Christian era.

THEMSE'LVES. *s.* (See THEY and SELF.) 1. These very persons (*Hooker*). 2. The oblique case of *they* and *selves*.

THEN. *ad.* (*than*, Gothic; ðan, Saxon; *dan*, Dutch.) 1. At that time (*Clarendon*). 2. Afterward; immediately afterward; soon afterward (*Bacon*). 3. In that case; in consequence (*Dryden*). 4. Therefore; for this reason (*Milton*). 5. At another time; as, now and *then*, at one time and another (*L'Estr.*). 6. That time (*Milton*).

THENAR. (θεναρ, the palm of the hand or sole of the feet.) See FLEXOR BREVIS POLLICIS MANUS.

THENCE. *ad.* 1. From that place (*Milton*). 2. From that time (*Isaiah*). 3. For that reason (*Milton*).

THE′NCEFORTH. *ad.* (*thence* and *forth.*) From that time (*Milton*).

THENCEFO′RWARD. *ad.* (*thence* and *forward.*) On from that time (*Kettlewell*).

THENGEN, a town of Suabia, capital of a princely county of the same name, in the landgravate of Nellenburg. It is situate on the Hegau, eight miles N. of Schaffhausen.

THEOBROMA. Chocolate tree. In botany, a genus of the class polyandria, order dodecandria. Calyx five-leaved; petals five, vaulted; nectary cup-shaped, five-horned; filaments ten, five of them bearing two anthers each, and five barren; style filiform; stigma five-parted; capsule five-celled, without valves; seeds imbedded in a butyraceous pulp. Two species.

1. T. cacao. Genuine chocolate tree. A native of South America. Leaves very entire, glabrous, oblong. Tree twenty feet high; flowers red: it delights in shady places and deep valleys. The pods are oval and pointed. The cocoa-nuts being gently parched in an iron pot over the fire, the external coat separates easily. The kernel is then levigated on a smooth stone; a little arnotto is added, and with a few drops of water is reduced to a mass, and formed into rolls of one pound each. This simple preparation of chocolate is the most natural and the best. It is in daily use amongst most families in Jamaica, where the tree is largely cultivated, and affords a nutritious food for children as well as adults.

This species is cultivated in our own hot-houses as a foreign variety, and is increased by seeds obtained from abroad.

2. T. Guianénsis. Leaves pointed, repand-toothed, downy underneath. Fruit reddish, downy. A native of Guiana.

THEOCRACY, in matters of government, a state governed by the immediate direction of God alone: such was the ancient government of the Jews before the time of Saul.

THEOCRA′TICAL. *a.* (*theocratique*, Fr.; from *theocracy.*) Relating to a government administered by God (*Burnet*).

THEOCRITUS, the father of pastoral poetry, was born at Syracuse in Sicily. Two of his poems ascertain his age; one addressed to Hiero king of Syracuse, who began his reign about 275 years before Christ; and the other to Ptolemy Philadelphus, king of Egypt. Hiero, though a prince distinguished in arms and political wisdom, does not seem to have been a patron of learning. This is supposed to have given birth to the 10th idyllium. From Syracuse Theocritus went to Alexandria, where he seems to have found a munificent patron in Ptolemy Philadelphus, if we may judge from the panegyric which he composed on that prince (the 17th idyllium). It has been said that Theocritus was strangled by Hiero, but we have not found evidence of this.

The compositions of this poet are distinguished, among the ancients, by the name of idylliums, in order to express the smallness and variety of their natures: they would now be called miscellanies, or poems on several occasions. The first nine and the eleventh are confessed to be true pastorals, and hence Theocritus has usually passed for nothing more than a pastoral poet; yet he is manifestly robbed of a great part of his fame, if his other poems have not their proper laurels. For though the greater part of his idylliums cannot be called the songs of shepherds, yet they have certainly their respective merits. His pastorals ought to be considered as the foundation of his credit; upon this claim he will be admitted for the finisher as well as the inventor of his art; and will be acknowledged to have excelled all his imitators as much as originals usually do their copies.

The works of this poet were first published in folio, by Aldus Manutius, at Venice, in 1495. A more elegant and correct edition was printed by Henry Stephens, at Paris, in 1566. An edition was published at Leipsic, in 1765, with valuable notes by the learned Reiske. But what will very highly gratify the admirers of pastoral poetry, is an edition published in 1770, 2 vols. 4to. by Mr. Thomas Warton. It is accompanied by the scholia of the best editors, and the different readings of fifteen MSS. Very valuable later editions are those of Valckenaer, in 1773 and 1779, and Zamagna's beautiful and correct edition, published at Parma, in 1792. The best English translations are those of Fawkes and of Polwhele.

THEODECTUS, a Greek orator and poet of Phaselis in Pamphylia, son of Aristander, and disciple of Isocrates. He wrote 50 tragedies besides other works now lost. He had such a happy memory, that he could repeat with ease whatever verses were spoken in his presence. When Alexander passed through Phaselis, he crowned with garlands the statue which had been erected to the memory of the deceased poet.

THEODOLITE, a mathematical instrument much used in surveying, for the taking of angles, distances, &c. It is made variously, different persons having their several ways of contriving it, each more simple and portable, more accurate and expeditious than others. The common one consists of a brass circle about a foot diameter, having its limb divided into 360 degrees, and each degree subdivided, either diagonally or by the nonius, into parts of 5, or of 3 minutes.

The better kind of theodolites have also a telescope, and a vertical arch susceptible of division to parts of 5, or of 3 minutes, by means of the nonius. The adjustments are the same as those described under the article LEVEL.

The finest theodolite ever made was that constructed by Mr. Ramsden, and employed in the trigonometical survey of England.

THEODORIC, first king of the Goths in Italy, was natural son of Theodomir, king of the Ostrogoths. He became consul 484, and was sent to Italy, against Odoacer, whom he defeated and put to death. Thus become master of all Italy, he strengthened his power by marrying, in 509, the sister of Clovis king of France, and by making a treaty of alliance with Anastatius, emperor of the East, and with the Vandals of Africa. While he promoted commerce, encouraged the arts, and patronized literature, he grew suspicious and cruel, and he caused to be put to death Symmachus and Boethius, two of the most illustrious of his subjects. This, it is said, preyed upon his mind, and he died soon after under the severest tortures of conscience, 526.

THEODOSIUS, a celebrated mathematician, who flourished in the times of Cicero and Pompey; but the time and place of his death are unknown. This Theodosius, the Tripolite, as mentioned by Suidas, is probably the same with Theodosius the philosopher of Bithynia, who Strabo says excelled in the mathematical sciences, as also his sons; for the same person might have travelled from the one of those places to the other, and spent part of his life in each of them; like as Hipparchus was called by Strabo the Bithynian; but by Ptolemy and others the Rhodian.

Theodosius chiefly cultivated that part of geometry which relates to the doctrine of the sphere, concerning which he published three books. The first of these contains 22 propositions; the second 23; and the third 14; all demonstrated in the pure geometrical manner of the ancients. Ptolemy made great use of these propositions, as well as all succeeding writers. These books were translated by the Arabians, out of the original Greek, into their own language. From the Arabic, the work was again translated into Latin, and printed at Venice. But the Arabic version being very defective, a more complete edition was published in Greek and Latin, at Paris, 1558, by John Pena, regius professor of astronomy. And Vitello acquired reputation by translating Theodosius into Latin. This author's works were also commented on and illustrated by Clavius, Heleganius, and Guarinus, and lastly by De Chales, in his Cursus Mathematicus. But that edition of Theodosius's Spherics which is now most in use was translated and published by our countryman, the learned Dr. Barrow, in the year 1675, illustrated and demonstrated in a new and concise method. By this author's account, Theodosius appears not only to be a great master in this more difficult part of geometry, but the first considerable author of antiquity who has written on that subject.

Theodosius too wrote concerning the Celestial Houses; also of Days and Nights; copies of which, in Greek, are in the king's library at Paris. Of which there was a Latin edition, published by Peter Dasypody, in the year 1572.

Theodosius Flavius, a Roman emperor sirnamed Magnus. The first years of his reign were marked by different conquests over the barbarians. The Goths were defeated in Thrace, and 4000 of their chariots, with an immense number of prisoners of both sexes, were the reward of the victory. This glorious campaign intimidated the inveterate enemies of Rome; they sued for peace, and treaties of alliance were made with distant nations. Some conspiracies were formed against the emperor, but Theodosius totally disregarded them. He triumphed over the barbarians, and restored peace in every part of the empire. He died of a dropsy at Milan, in the 60th year of his age, after a reign of 16 years, the 17th of January, A. D. 395. His body was conveyed to Constantinople, and buried by his son Arcadius, in the tomb of Constantine. Theodosius was the last of the emperors who was the sole master of the whole Roman empire. He left three children, Arcadius and Honorius who succeeded him, and Pulcheria. He has been commended by ancient writers as a prince blessed with every virtue, and debased by no vicious propensity. Though master of the world, he was a stranger to pride or arrogance; he was affable in his behaviour, benevolent and compassionate, and it was his wish to treat his subjects as himself was treated when a private man, and a dependant. Men of merit were promoted to places of trust and honour, and the emperor was fond of patronizing the cause of virtue and learning. He wished to support the revealed religion, as much by his example, meekness, and christian charity, as by his edicts and ecclesiastical institutions. His want of clemency, however, in one instance, was too openly betrayed, for by his order no less than 6000 persons, without distinction of rank, age, or sex, were cruelly butchered in Thessalonica, in the space of three hours, because the inhabitants of that town had unmeaningly, perhaps, killed one of his officers. Theodosius was compelled by St. Ambrose to do open penance in the church, and publicly to make atonement for this act of barbarity. In his private character Theodosius was an example of soberness and temperance. He was fond of bodily exercise. The laws and regulations which he introduced in the Roman empire were of the most salutary nature.—The 2d, succeeded his father Arcadius as emperor of the western Roman empire, though only in the 8th year of his age. He was governed by his sister Pulcheria, and by his ministers and eunuchs. He married Eudoxia, the daughter of a philosopher called Leontius, a woman remarkable for her virtues and piety. The territories of Theodosius were invaded by the Persians, but the emperor soon appeared at the head of a numerous force, and the two hostile armies met on the frontiers of the empire. The consternation was universal on both sides; without even a battle, the Persians fled, and no less than 100,000 were lost in the waters of the Euphrates. He died on the 29th of July, in the 49th year of his age, A.D. 450, leaving only one daughter, Licinia Eudoxia, whom he had married to the emperor Valentinian 3d. His carelessness and inattention to public affairs is well known. He signed all the papers that were brought to him without even opening them, till his sister rendered him more careful by making him sign a paper, in which he delivered into her hands Eudoxia his wife as a slave and menial servant. The laws and regulations promulgated under him, and selected from the most useful and salutary institutions of his imperial predecessors, have been called the Theodosian code. Theodosius was a warm advocate for the Christian religion.

THEO'GONY. s. (ϑεογονια.) The generation of the gods (*Bailey*).

THEO'LOGER. **Theolo'gian.** *s.* (*theologien*, French; *theologus*, Latin.) A divine; a professor of divinity (*Milton*).

THEOLO'GICAL. *a.* (*theologia*, Latin.) Relating to the science of divinity (*Swift*).

THEOLO'GICALLY. *ad.* According to the principles of theology.

THEO'LOGIST. **The'ologue.** *s.* (*theologus*, Latin.) A divine; one studious in the science of divinity (*Dryden*).

THE'OLOGY. (from Θεος, God, and λογος, discourse, divinity.) A science which instructs us in the knowledge of God, and divine things; or which has God, and the things he has revealed, for its object.

Theology is a science which shews us what we are to believe of God, and the manner wherein he would be served. It is divided into two branches, the natural, and the revealed or supernatural.

Theology (Natural), is the knowledge we have of God from his works, by the light of nature and reason.

Theology (Supernatural), is that which we learn from revelation.

Theology (Positive), is the knowledge of the Holy Scriptures, and of the signification thereof, conformably to the opinions of the fathers and councils; without the assistance of any argumentation. But some will have it, that this ought to be called expositive, rather than positive.

Theology (Moral), is that which teaches us the divine laws relating to our manners and actions; in contradistinction to

Theology (Speculative), which explains and establishes the doctrines of religion as objects of faith.

Theology (Scholastic, or school), is that which proceeds by reasoning; or that derives the knowledge of several divine things from certain established principles of faith.

Other divisions of theology are into casuistic, catechetic, dogmatic, pastoral, controversial, &c. The last, though an unfortunate species, has its use, in so far as it serves to explode error, and while it is conducted with proper temper.

There are some errors that attack the system of religion, and there are others that attack even its morality. In order properly to oppose an error, we must begin by finding out its real meaning: we must therefore study the different systems of other religions, and the principal heresies, if we would successfully refute them. We do not mean by this, that the theologian should know all the errors that spring up in the brain of each individual; we speak only of those that are professed by whole sects. They who attack our religion, found their opinions either on the interpretation of the sacred text, or on philosophy or history; and we should always oppose them with the same arms with which they pretend to defeat us. It is necessary to begin by divesting ourselves of all prejudice, in order the better to shew others those prejudices by which they are deluded. We should never make use, but especially when we oppose weak minds, of opprobious terms in the course of the debate, nor contend about words or expressions, nor attack incidental circumstances that may attend erroneous principles; but bend our whole force against the root of the tree, the principal error; to uncover it, to dig it up, to destroy it.

Polemic theology is taught in universities by two methods, according to the views of the student. If he learn it merely in order hereafter to defend his parishioners against the most prevalent errors, he is only to examine the principal controversies according to the systematic order of theology; and may content himself with knowing their true meaning, together with the arguments of those that oppose them. But if it be his intention to teach this science to others, or to engage in controversy, either by conversation or writing; in short, if he aspire to renown in it, he should study the origin and history of each controversy, he should make himself a complete master of the arguments for and against it, the exceptions that it makes, its interests, its different revolutions and actual state, &c. These follow, in this study, either the order established in the dogmatic, or that which is used in symbolic books, that is, such as treat on articles of faith.

In order the better to elucidate the method to be observed in this sort of study, we shall say, that to acquire a complete knowledge of theological disputes, the student should, 1. Make the examen of each religion, and even of each controversy. 2. He should thoroughly examine his system in the symbolic books, and likewise the sources of his religion. 3. He should precisely determine the principal and capital error of each religion, sect, or individual; that which is the source from whence all the other errors flow. 4. Search into the political causes of each error, and each controversy, from history. 5. Examine the natural order according to which all the errors have taken their rise, the one from the other: and lastly, 6. Confront the respective arguments, the answers, and exceptions, that each party has made to defend its cause. To all this is to be added, 7. What they call *collegium disputatorium*; an exercise by which all that is learned in the closet and in the schools is called forth and animated, under the inspection of a professor; and the mind is accustomed to think, and the tongue to speak, with facility and efficacy.

The principal contests in which the theologian may be engaged are, 1. Against those who admit of no revealed religion; as the atheist and deist. 2. Against those who admit of a revealed religion, but adopt not the true.

revelation; as the Heathens, the Mahometans, &c. 3. Against those who believe only a part of the true revelation; as the Jews. 4. Against those who add to the true revelation matter foreign to it; as traditions, &c. 5. Against those who make a false interpretation of the sacred text, and draw from it erroneous systems; as heretics. And lastly, 6. Against those who make a wrong use of certain expressions of revelation, and build on whimsical notions, ridiculous systems; the fanatics, &c.

According to this division, the theologian will have to combat principally with,

1. The Atheists, with Spinosa at their head. 2. The Deists. 3. The Heathens and Idolaters. 4. The Mahometans. 5. The modern Jews. 6. The Arians and the Manicheans, or rather those who in these days follow their ancient errors. 7. The Socinians. 8. The Catholics, opposed to the Protestants. 9. The Protestants, opposed to the Catholics. 10. The Molinists, opposed to the Jansenists. 11. The Jansenists, opposed to the Molinists. 12. The Reformed, opposed to the Lutherans. 13. The Lutherans, opposed to the Reformed. 14. The Pietists, the Muggletonians, the Huntingtonians, &c.

Now, as each of the religions, communions, or heresies, above mentioned, have not scrupled to publish to the world their dogmas and creeds, the theologian ought carefully to instruct himself in those symbolic books, in which each of them have comprised its system; to study and to make a good analysis of them; and to prepare such arguments as are the most just, the most weighty, and proper to confute them.

Before we quit this subject, there is one remark to be made, or rather one caution that is very essential, which we would offer to the young theologian; which is, that the polemic is useful, and even necessary, in the study of theology in general; but that it is a discipline which ought to be treated with great prudence and moderation. Disputation in general is a dangerous art; and religious disputation is a deceitful art, and of infinite peril. The student will do right well to remember, that there is no sect, no communion on earth, that is perfectly true in all its dogmas without exception; that there are some small errors in all religions, because human explications even of the true religion are liable, more or less, to indicate human imperfection; and therefore that infallibility never was, nor ever will be, the portion of humanity. He should likewise remember, that the masters who teach him, or the books that he reads, are constantly partial to the religion they profess: and that when he has supported a thesis, and confuted his adversaries in a collegial dispute (where his adversaries, as well as his preceptors, are of the same side of the question, and will not fail to adjudge him the victory), he should be persuaded, that the victory would not have been so easily obtained had he contended with able adversaries of the opposite religion: he should remember, that we triumph without glory when we combat without danger; and let him not be vain of his laurels, nor imagine himself some wonderful scholar; seeing that it is very possible that he may go off victorious from such a dispute, that he may receive vast applause from his professors and his colleagues, and at the same time have reasoned like a dolt.

On the other hand, the most able theologians, and the most consummate professors in this science, ought to be constantly on their guard against the abuse of polemic theology; which frequently serves less to clear and confirm the truth of the dogmas of a communion, than to establish perpetual discord and hatred among Christians. Every theologian should also remember, that, by the nature of the subject, it is not possible to produce demonstration in support of his theses and opinions; but that his arguments will be only valid, and preponderate in proportion to their degree of evidence; and lastly, that it is a ridiculous and insufferable vanity to imagine, that every man, who does not think precisely as we do, is guilty of palpable, much more, of damnable, error.

It has often happened in theological controversies, that the greatest rancour and uncharitableness has subsisted where the difference has been the most trifling. Thus, among the Arminians and Calvinists, who agree in all the essentials of Christianity, the most virulent invective has been often indulged: one party interpreting the doctrine of predestination as odious blasphemy; the other crying down universal redemption and free will as contrary to God's grace. "Yet most probably,' as Dr. Gregory (in the 2d volume of his Letters on the Christian Religion) has remarked with respect to these opposed systems, "there is some middle point, where all that is good in either seems to meet, and all that is exceptionable to be excluded."

Other men, of no trifling character both for their mental and moral excellence, as Watts, Doddridge, Barrow, Simeon, Dealtry, Ely Bates, &c. have avowed a similar sentiment. And to a like effect spoke good Richard Baxter, at pa. 17, of his book on Doctrinal Controversies.

"Being carried down," says he, "by the stream of many good men's opinions, I was, myself, some years confident that Arminianism was a character of an enemy to the soundness and safety of the church. But when I had set myself thoroughly and impartially to study it, I found that which so amazed me, that I durst scarce believe, what I could not deny; even that from the beginning of the quarrel between Augustine and Pelagius, all the voluminous contentions of the Thomists or Dominicans, and the Jesuits, and Franciscans, and between the Lutherans and Zuinglians, herein, and the Synodists and Arminians, have been mostly about, either unsearchable things, which neither side understood, or about ambiguous words, which one party taketh in one sense, and the other in another; or about the mere methodizing and ordering of the notions which both sides are agreed in; and that, indeed, the most persons reach not the very point of the difficulty and controversy, but talk before they understand, as their leaders have taught them: and that when the matter is distinctly opened, it is found that multitudes that write, rail, and plot, against one another, are really of one opinion, *de rebus*, and did not know it: and that the few remaining controversies that are real, and not merely verbal, are but of such small or dubious things, as should break no love or communion among Christians; but all should with forbearance love each other in that liberty of judging which they cannot remedy."

THEO'MACHIST. *s.* He who fights against the gods (*Bailey*).

THEO'MACHY. *s.* (Θεὸς and μάχη.) The fight against the gods by the giants (*Bailey*).

THEON, of Alexandria, a celebrated Greek philosopher and mathematician, who flourished in the 4th century, about the year 380, in the time of Theodosius the Great; but the time and manner of his death are unknown. His genius and disposition for the study of philosophy were very early improved by close application to all its branches; so that he acquired such proficiency in the sciences as to render his name venerable in history, and to procure him the honour of being president of the famous Alexandrian school. One of his pupils was the admirable Hypatia, his daughter, who succeeded him in the presidency of the school; a trust which, like himself, she discharged with the greatest honour and usefulness.

The study of nature led Theon to many just conceptions concerning God, and to many useful reflections in the science of moral philosophy. Hence, it is said, he wrote with great accuracy on Divine Providence. And he seems to have made it his standing rule to judge the truth of certain principles, or sentiments, from their natural or necessary tendency. Thus, he says, that a full persuasion that the Deity sees every thing we do, is the strongest incentive to virtue; for he insists, that the most profligate have power to refrain their hands, and hold their tongues, when they think they are observed, or overheard, by some person whom they fear or respect. With how much more reason then, says he, should the apprehension and belief that God sees all things restrain men from sin, and constantly excite them to their duty? He also represents this belief concerning the Deity as productive of the greatest pleasure imaginable, especially to the virtuous, who might depend with greater confidence on the favour and protection of Providence. For this reason, he recommends nothing so much as meditation on the presence of God: and he recommended it to the civil magistrate as a restraint on such as were profane and wicked, to have the following inscription written, in large characters, at the corner of every street—GOD SEES THEE, O SINNER.

Theon wrote notes and commentaries on some of the ancient mathematicians. He composed also a book, intitled Progymnasmata, a rhetorical work, written with great judgment and elegance; in which he criticised on the writings of some illustrious orators and historians; pointing out, with great propriety and judgment, their beauties and imperfections; and laying down proper rules for propriety of style. He recommends conciseness of expression, and perspicuity, as the principal ornaments. This book was printed at Basle in the year 1541; but the best edition is that of Leyden, in 1626, in 8vo.

THEOPHANES, a Greek historian born at Mitylene. He was very intimate with Pompey, and from his friendship with the Roman general his countrymen derived many advantages. After the battle of Pharsalia, he advised Pompey to retire to the court of Egypt.

THEOPHILANTHROPISTS, a sect of deists, who, in September 1796, published at Paris a sort of catechism or directory for social worship, under the title of Manuel des Theanthrophiles. This religious breviary found favour: the congregation became numerous; and in the second edition of their manual they assumed the less harsh denomination of Theophilanthropes, i. e. lovers of God and man. A book of hymns, a liturgy for every decade of the French year, and an homiletical selection of moral lessons, are announced, or published, by their unknown synod. Thus they possess a system of pious services adapted to all occasions, which some one of the individuals who attend reads aloud; for they object to the employment of a regular lecturer, in consequence of their hostility to priests.—This novel sect was countenanced by Lareveillere Lepaux, one of the directory, and, soon after its formation, opened temples of its own in Dijon, and in other provincial towns. They had declamations in the spirit of sermons, which abounded with such phrases as *l'eternal geometre*, and the like. The creed of the Theophilanthropists is comprised in the four following propositions:

The Theophilanthropists believe in the existence of God, and the immortality of the soul.

The spectacle of the universe attests the existence of the First Being.

The faculty which we possess of thinking, assures us, that we have, within ourselves, a principle which is superior to matter, and which survives the dissolution of the body.

The existence of God, and the immortality of the soul, do not need long demonstrations; they are sentimental truths, which every one may find written in his heart, if he consult it with sincerity.

Thus a sort of religious instinct is set up as the sole foundation of piety, which every one has as much right to disavow as another to assert; and the obligations of which, therefore, can in no way be shewn to be incumbent on those to whom this novel illumination is not vouchsafed. Society, under such a system, gains no means of influencing the conduct of refractory members.

The morality of the Theophilanthropists is founded on one single precept: Worship God, cherish your kind, render yourselves useful to your country!

Among the duties comprehended under the denomination of cherishing our kind, we find that of not lending for usury: the others are chiefly extracted from the gospels, and do not interfere with the province of the civil magistrate. The question of monogamy is not discussed.

Among the duties to our country are placed those of fighting in its defence, and of paying the taxes. It was certainly prudent in the statesman to slide these duties into the catalogue of his established maxims of morality; and he ran thereby little risk of provoking heretical animadversions on his creed in France.

The following inscriptions are ordered to be placed above the altars in the several temples or synagogues of the Theophilanthropists; but for what reason altars are admitted into such synagogues we are not informed:

First inscription, "We believe in the existence of God, in the immortality of the soul."

Second inscription, "Worship God, cherish your kind, render yourselves useful to the country."

Third inscription, "Good is every thing which tends to the preservation or the perfection of man.—Evil is every thing which tends to destroy or to deteriorate him."

Fourth inscription, "Children, honour your fathers and mothers. Obey them with affection. Comfort their old age.—Fathers and mothers, instruct your children."

Fifth inscription, "Wives, regard in your husbands the chiefs of your houses.—Husbands, love your wives, and render yourselves reciprocally happy."

This pentalogue is chiefly objectionable on account of the vague drift of the fifth commandment: the whole has too general a turn for obvious practical application. The introduction of ceremonies, of sculpture, of painting, and of engraving, is forbidden. If poetry and music may concur to render the worship impressive, why not the other fine arts? The fine arts have never illustrated a country which excluded them from the public temples.

At p. 28 of the manual, this surprising maxim occurs: Avoid innovations! A sect fifteen months old grown as testy as the church of Rome! They acknowledge, that perhaps better inscriptions may be found; yet they forbid the exchange. They prefer *mumpsimus* to the *sumpsimus* of genuine Christianity!

How many years, or how many months, this sect continued, we have not been able to ascertain: we believe they ceased to exist before the end of the eighteenth century.

THEOPHILUS, a writer and bishop of the primitive church, was educated a heathen, and afterwards converted to Christianity. Some have imagined that he is the person to whom St. Luke dedicates the Acts of the Apostles; but they are grossly mistaken; for this Theophilus was so far from being contemporary with St. Luke and the apostles, that he was not ordained bishop of Antioch till anno 170; and he governed this church twelve or thirteen years. He was a vigorous opposer of certain heretics of his time, and composed a great number of works; all of which are lost, except three books to Autolycus, a learned heathen of his acquaintance, who had undertaken to vindicate his own religion against that of the Christians. The first book is properly a discourse between him and Autolycus, in answer to what this heathen had said against Christianity. The second is to convince him of the falsehood of his own, and the truth of the Christian religion. In the third, after having proved that the writings of the heathens are full of absurdities and contradictions, he vindicates the doctrine and the lives of the Christians from those false and scandalous imputations which were then brought against them. Lastly, at the end of his work, he adds an historical chronology from the beginning of the world to his own time, to prove that the history of Moses is at once the most ancient and the truest; and it appears from this little epitome, how well this author was acquainted with profane history. These three books are filled with a great variety of curious disquisions concerning the opinions of the poets and philosophers, and there are but few things in them relating immediately to the doctrines of the Christian religion. Not that Theophilus was ignorant of these doctrines, but, having composed his works for the conversion of a pagan, he insisted rather on the external evidence or proofs from without, as better adapted, in his opinion, to the purpose. His style is elegant, and the turn of his thoughts very agreeable; and this little specimen is sufficient to shew that he was indeed a very eloquent man.

The piece is entitled, in the Greek manuscripts, The Books of Theophilus to Autolycus, concerning the Faith of the Christians, against the malicious Detractors of their Religion. They were published, with a Latin version, by Conradus Gesner, at Zurich, in 1546. They were afterwards subjoined to Justin Martyr's works, printed at Paris in 1615 and 1636; then published at Oxford, 1684, in 12mo. under the inspection of Dr. Fell; and, lastly, by Jo. Christ. Wolfius, at Hamburgh, 1723, in 8vo.

It is remarkable, that this patriarch of Antioch was the first who applied the term Trinity to express the Three Persons in the Godhead.

THEOPHRASTA, in botany, a genus of the class pentandria, order monogynia. Corol campanulate, the segments and divisions obtuse; capsule one-celled, globular, very large, many-seeded. Two species; shrubs of South America, with the trunk naked up to the top in one of them.

THEOPHRASTUS, a celebrated Greek philosopher, was the son of Melanthus, and was born at Eretus in Bœotia. He was at first the disciple of Leucippus, then of Plato, and lastly of Aristotle; whom he succeeded in his school, about the 322d year before the Christian era, and taught philosophy at Athens with great applause.

He said of an orator without judgment, "that he was a horse without a bridle." He used also to say, "There is nothing so valuable as time, and those who lavish it are the most inexcusable of all prodigals."—He died at about 100 years of age.

Theophrastus wrote many works, the principal of which are the following. 1. An excellent moral treatise entitled, Characters, which, he says in the preface, he composed at 99 years of age. Isaac Casaubon has written learned commentaries on this small treatise. It has been translated from the Greek into French, by Bruyere; and it has also been translated into English. 2. A curious Treatise on Plants. 3. A Treatise on Fossils or Stones; of which Dr. Hill has given a good edition, with an English translation, and learned notes, in 8vo.

THEORBO. An old stringed instrument resembling the lute both in tone and form: the only difference being, that the theorbo has eight bass strings, twice as long as those of the lute, which renders their tone exceedingly soft and pleasing, and that it has two necks, the longest of which sustains the four last, or deepest-toned strings. The theorbo is said to have been invented in France by the Sieur Hotteman, and thence introduced into Italy.

THEOREM, a proposition which terminates in theory, and which considers the properties of things already made or done. Or, a theorem is a speculative proposition, deduced from several definitions compared together. Thus, if a triangle be compared with a parallelogram standing on the same base, and of the same altitude, and partly from their immediate definitions, and partly from other of their properties already determined, it is inferred that the parallelogram is double the triangle; that proposition is a theorem.

Theorem stands contradistinguished from problem, which denotes something to be done or constructed, as a theorem proposes something to be proved or demonstrated.

There are two things to be chiefly regarded in every theorem, viz. the proposition, and the demonstration. In the first is expressed what agrees to some certain thing, under certain conditions, and what does not. In the latter, the reasons are laid down by which the understanding comes to conceive that it does or does not agree to it.

Theorems are of various kinds: as,

Universal theorem, is that which extends to any quantity without restriction, universally. As this, that the rectangle or product of the sum and difference of any two quantities, is equal to the difference of their squares.

Particular theorem, is that which extends only to a particular quantity. As this: in an equilateral rectilinear triangle, each angle is equal to 60 degrees.

Negative theorem, is that which expresses the impossibility of any assertion. As, that the sum of two biquadrate numbers cannot make a square number.

Local theorem, is that which relates to a surface. As, that triangles of the same base and altitude are equal.

Plane theorem, is that which relates to a surface that is either rectilinear or bounded by the circumference of a circle. As, that all angles in the same segment of a circle are equal.

Solid theorem, is that which considers a space terminated by a solid line, that is, by any of the three conic sections.

THEOREMA′TICAL. Theorema′tic. Theore′mic. *a.* (from *theorem.*) Comprised in theorems; consisting in theorems (*Grew*).

THEORE′TICAL. Theore′tic. Theo′rical. The′oric. *a.* (*theoretique*, Fr. from ϑεωρητικος; and *theorique*, Fr. from ϑεωρια.) Speculative; depending on theory or speculation; terminating in theory or speculation (*Boyle. Burnet*).

THEORE′TICALLY. Theo′rically. *ad.* (from *theoretic*, and *theoric.*) Speculatively; not practically.

THEO′RIC. *s.* (from the adjective.) Speculation; not practice (*Shakspeare*).

THE′ORIST. *s.* (from *theory.*) A speculatist; one given to speculation (*Addison*).

THE′ORY. *s.* (*theorie*, Fr. ϑεωρια.) Speculation; not practice; scheme; plan or system yet subsisting only in the mind (*Bacon*).

THEOSOPHISTS, a sect of men who pretend to derive all their knowledge from divine illumination. They boast that, by means of this celestial light, they are not only admitted to the intimate knowledge of God, and of all divine truth, but have access to the most sublime secrets of nature. They ascribe it to the singular manifestation of divine benevolence, that they are able to make such a use of the element of fire, in the chemical art, as enables them to discover the essential principles of bodies, and to disclose stupendous mysteries in the physical world. They even pretend to an acquaintance with those celestial beings which form the medium of intercourse between God and man, and to a power of obtaining from them, by the aid of magic, astrology, and other similar arts, various kinds of information and assistance.

To this class belonged Paracelsus, Robert Fludd, Jacob Boehmen, Van Helmont, Peter Poiret, and the Rosicrucians. They are also called fire-philosophers.

THERAMENES, an Athenian philosopher and general in the age of Alcibiades. He was one of the 30 tyrants at Athens, but he had no share in the cruelties and oppression which disgraced their administration. He was accused by Critias, one of his colleagues, and condemned to drink hemlock. He drank the poison with great composure, and poured some of it on the ground, with the sarcastical exclamation of, "This is to the health of Critias." This happened about 404 years before the Christian era. Theramenes has been called

Cothurnus, on account of the fickleness of his disposition.

THERAPEUTÆ, so called from the extraordinary purity of their religious worship, were a Jewish sect, who, with a kind of religious phrenzy, placed their whole felicity in the contemplation of the divine nature. Detaching themselves wholly from secular affairs, they transferred their property to their relations or friends, and withdrew into solitary places, where they devoted themselves to a holy life. The principal society of this kind was formed near Alexandria, where they lived, not far from each other, in separate cottages, each of which had its own sacred apartment, to which the inhabitant retired for the purposes of devotion. After their morning prayers, they spent the day in studying the law and the prophets, endeavouring, by the help of the commentaries of their ancestors, to discover some allegorical meaning in every part. Besides this, they entertained themselves with composing sacred hymns in various kinds of metre. Six days of the week were, in this manner, passed in solitude. On the seventh day they met, clothed in a decent habit, in a public assembly; where, taking their places according to their age, they sat, with the right hand between the breast and the chin, and the left at the side. Then some one of the elders, stepping forth into the middle of the assembly, discoursed, with a grave countenance and a calm tone of voice, on the doctrines of the sect; the audience, in the mean time, remaining in perfect silence, and occasionally expressing their attention and approbation by a nod. The chapel where they met was divided into two apartments; one for the men, the other for the women. So strict a regard was paid to silence in these assemblies, that no one was permitted to whisper, or even to breathe aloud; but when the discourse was finished, if the question which had been proposed for solution had been treated to the satisfaction of the audience, they expressed their approbation by a murmur of applause. Then the speaker, rising, sung a hymn of praise to God, in the last verse of which the whole assembly joined. On great festivals, the meeting was closed with a vigil, in which sacred music was performed, accompanied with solemn dancing; and these vigils were continued till morning, when the assembly, after a morning prayer, in which their faces were directed towards the rising sun, was broken up.

THERAPE′UTIC. *a.* (θεραπευτικος.) Curative; teaching or endeavouring the cure of diseases (*Watts*).

THERE. *ad.* (*thar*, Gothic; ðæꞃ, Saxon.) 1. In that place (*Pope*). 2. It is opposed to *here* (*Milton*). 3. An exclamation directing something at a distance (*Dryden*). 4. In composition it means *that*.

THE′REABOUT. THE′REABOUTS. *ad.* (*there* and *about*; *thereabouts* is therefore less proper.) 1. Near that place (*Shakspeare*). 2. Nearly; near that number, quantity or state (*Suckling*). 3. Concerning that matter (*Luke*).

THEREA′FTER. *ad.* (*there* and *after.*) According to that; accordingly (*Peacham*).

THEREA′T. *ad.* (*there* and *at.*) 1. At that; on that account (*Hooker*). 2. At that place (*Matthew*).

THEREBY′. *ad.* (*there* and *by.*) By that; by means of that; in consequence of that (*Spenser*).

THE′REFORE. *ad.* (*there* and *for.*) 1. For that; for this; for this reason (*Shakspeare*). 2. Consequently (*West*). 3. In return for this; in recompense for this or for that (*Matthew*).

THEREFRO′M. *ad.* (*there* and *from.*) From that; from this (*Joshua*).

THEREI′N. *ad.* (*there* and *in.*) In that; in this (*Bacon*).

THEREINTO′. *ad.* (*there* and *into.*) Into that (*Bacon*).

THEREO′F. *ad.* (*there* and *of.*) Of that; of this (*Hooker*).

THEREO′N. *ad.* (*there* and *on.*) On that (*Shakspeare*).

THEREO′UT. *ad.* (*there* and *out.*) Out of that (*Spenser*).

THERETO′. THEREUNTO′. *ad.* (*there* and *to*, or *unto.*) To that (*Tillotson*).

THEREU′NDER. *ad.* (*there* and *under.*) Under that (*Raleigh*).

THEREUPO′N. *ad.* (*there* and *upon.*) 1. Upon that; in consequence of that (*Swift*). 2. Immediately.

THEREWI′TH. *ad.* (*there* and *with.*) 1. With that (*Hooker*). 2. Immediately.

THEREWITHA′L. *ad.* (*there* and *withal.*) 1. Over and above (*Daniel*). 2. At the same time (*Shakspeare*). 3. With that (*Spenser*).

THERIACA. (θηριακα; from θηρ, a viper, or venomous wild beast.) Treacle, melasses; also a medicine appropriated to the cure of the bites of venomous animals, or to resist poisons.

THERIACA RUSTICORUM. The roots of the common garlic were so called. See ALLIUM.

THERMÆ. Warm baths or springs. See MEDICINAL WATERS.

THERMIA, an island of the Archipelago, S. of the island of Zia, and near the gulf of Engia, 12 miles long and five broad. The soil is good and well cultivated, and it has a great deal of silk. The principal town, of the same name, is the residence of a Greek bishop. Lon. 24. 59 E. Lat. 37. 31 N.

THERMOMETER, an instrument for measuring the degree of heat or cold in any body. The first form of this instrument for measuring the degrees of heat and cold was the air-thermometer. It is a well known fact that air expands with heat so as to occupy more space than it does when cold, and that it is condensed by cold so as to occupy less space than when warmed, and that this expansion and condensation is greater or less according to the degree of heat or cold applied. The principle then on which the air-thermometer was constructed is very simple. The air was confined in a tube by means of some coloured liquor; the liquor rose or fell according as the air became expanded or condensed. What the first form of the tube was, cannot now perhaps

Fig. 1.

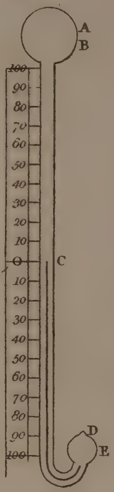
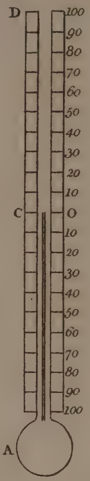


Fig. 2.



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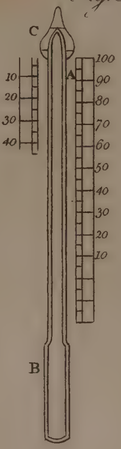

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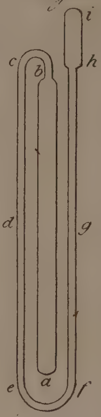

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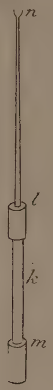

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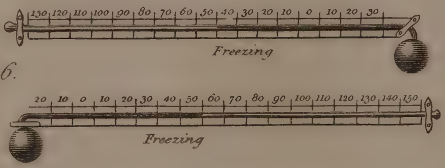

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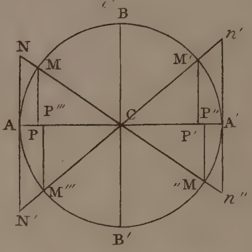

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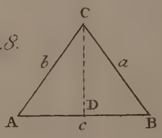


Fig. 7.

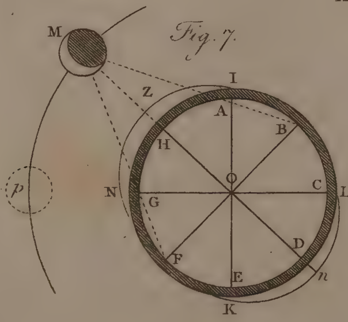
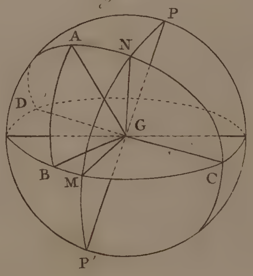


Fig. 10.



Mutlow, Sc.

London, Published by Sherwood & Co. Paternoster Row, May 1. 1813.

be well known; but the following description of the air-thermometer will fully explain its nature. It consists of a glass tube, BE, (Pl. 170. fig. 1.) connected at one end with a large glass ball, A, and at the other end immersed in an open vessel, or terminating in a ball, DE, with a narrow orifice at D; which vessel or ball contains any coloured liquor that will not easily freeze. Aquafortis tinged of a fine blue colour with a solution of vitriol or copper, or spirit of wine tinged with cochineal, will answer this purpose. But the ball, A, must be first moderately warmed, so that a part of the air contained in it may be expelled through the orifice, D; and then the liquor pressed by the weight of the atmosphere will enter the ball, DE, and rise, for example, to the middle of the tube at C, at a mean temperature of the weather; and in this state the liquor by its weight, and the air included in the ball, A, &c. by its elasticity, will counterbalance the weight of the atmosphere. As the surrounding air becomes warmer, the air in the ball and upper part of the tube, expanding by heat, will drive the liquor into the lower ball, and consequently its surface will descend; on the contrary, as the ambient air becomes colder, that in the ball is condensed, and the liquor pressed by the weight of the atmosphere will ascend; so that the liquor in the tube will ascend or descend more or less according to the state of the air contiguous to the instrument. To the tube is affixed a scale of the same length, divided upwards and downwards from the middle, C, into 100 equal parts, by means of which the ascent and descent of the liquor in the tube, and consequently the variations in the cold or heat of the atmosphere, may be observed.

The air being found improper for measuring with accuracy the variations of heat and cold according to the form of the thermometer which was first adopted, another fluid was proposed about the middle of the seventeenth century by the Florentine Academy. This fluid was spirit of wine, or alcohol, as it is now generally named. The alcohol being coloured, was inclosed in a very fine cylindrical glass tube previously exhausted of its air, having a hollow ball at one end, A, (fig. 2.) and hermetically sealed at the other end, D. The ball and tube are filled with rectified spirit of wine to a convenient height, as to C, when the weather is of a mean temperature, which may be done by inverting the tube into a vessel of stagnant coloured spirit, under a receiver of the air-pump, or in any other way. When the thermometer is properly filled, the end D is heated red hot by a lamp, and then hermetically sealed, leaving the included air of about one-third of its natural density, to prevent the air which is in the spirit from dividing it in its expansion. To the tube is applied a scale, divided from the middle, into 100 equal parts, upwards and downwards. As spirit of wine is capable of a very considerable degree of rarefaction and condensation by heat and cold, when the heat of the atmosphere increases the spirit dilates, and consequently rises in the tube; and when the heat decreases, the spirit descends, and the degree or quantity of the motion is shown by a scale.

This was evidently an improvement on the air-thermometer, but was itself not free from objections. The liquor could not easily be obtained of the same strength, and hence different tubes filled with it, when exposed to the same degree of heat, would not correspond. Another defect was the want of some fixed guide as a standard to commence the graduation. Philosophers soon saw that some fixed and unalterable point must be found, by which all thermometers might be accurately adjusted. Dr. Halley proposed that thermometers should be graduated in a deep pit, where the temperature in all seasons was nearly the same. This however could not generally be practised. He thought of the boiling point of water, of mercury, and of spirit of wine, prefering the latter, on account of the freezing of water, not knowing that this was fixed and uniform. At length sir Isaac Newton determined this important point, on which the accuracy and value of the thermometer depends. He chose, as fixed, those points at which water freezes and boils; the very points which the experiments of succeeding philosophers have determined to be the most fixed and convenient. Sensible of the disadvantages of spirit of wine, he tried another liquor, which was homogeneous enough, and capable of a considerable rarefaction, several times greater than spirit of wine. This was linseed oil. It has not been observed to freeze even in very great colds, and it bears a heat very much greater than water before it boils. With these advantages it was made use of by sir Isaac Newton, who discovered by it the comparative degree of heat for boiling water, melting wax, boiling spirit of wine, and melting tin; beyond which it does not appear that this thermometer was applied. The method he used for adjusting the scale of this oil-thermometer was as follows: supposing the bulb, when immerged in thawing snow, to contain 10,000 parts, he found the oil expand by the heat of the human body so as to take up one thirty-ninth more space, or 10,256 such parts; and by the heat of water boiling strongly 10,725; and by the heat of melting tin 11,516. So that reckoning the freezing point as a common limit between heat and cold, he began his scale there, marking it 0, and the heat of the human body he made 12°; and consequently, the degrees of heat being proportional to the degrees of rarefaction, or 256 : 725 : : 12 : 34, this number 34 will express the heat of boiling water; and by the same rule, 72 that of melting tin. This thermometer was constructed in 1701. To the application of oil as a measure of heat and cold there are insuperable objections. It is so viscid, that it adheres too strongly to the sides of the tube. On this account it ascends and descends too slowly in case of a sudden heat or cold. In a sudden cold, so great a portion remains adhering to the sides of the tube after the rest has subsided, that the surface appears lower than the corresponding temperature of the air requires. An oil thermometer is therefore not a proper measure of heat and cold. All the thermometers hitherto proposed were liable to many inconveniences, and could not be considered as exact standards for pointing out the various degrees of temperature. This led Reaumur to attempt a new one, an account of which was published in the year 1730 in the Memoirs of the Academy of Sciences. This thermometer was made with spirit of wine. He took a large ball and tube, the dimensions and capacities of which were known; he then graduated the tube, so that the space from one division to another might contain 1,000th part of the liquor; the liquor containing 1,000 parts when it stood at the freezing point. He adjusted the thermometer to the freezing point by an artificial congelation of water; then putting the ball of his thermometer and part of the tube into boiling water, he observed whether it rose 80 divisions; if it exceeded these, he changed his liquor, and by adding water lowered it, till upon trial it should just rise 80 divisions; or if the liquor, being too low, fell short of 80 divisions, he raised it by adding rectified spirit to it. The liquor thus prepared suited his purpose, and served for making a thermometer of any size, whose scale would agree with his standard. At length a different fluid was proposed, by which thermometers could be made free from most of the defects hitherto mentioned. This fluid was mercury, and seems first to have occurred to Dr. Halley, but was not adopted by him on account of its having a smaller degree of expansibility than the other fluids used at that time.

The honour of this invention is generally given to Fahrenheit of Amsterdam, who presented an account of it to the Royal Society of London in 1724. That we may judge the more accurately of the propriety of employing mercury, we will compare its qualities with those of the fluids already mentioned, air, alcohol, and oil. Air is the most expansible fluid, but it does not receive nor part with its heat so quickly as mercury. Alcohol does not expand much by heat. In its ordinary state it does not bear a much greater heat than 175° of Fahrenheit; but when highly rectified it can bear a greater degree of cold than any other liquor hitherto employed as a measure of temperature. At Hudson's Bay, Mr. Macnab, by a mixture of vitriolic acid and snow, made it to descend to 69° below 0 of Fahrenheit. There is an inconvenience, however, attending the use of this liquor; it is not possible to get it always of the same degree of strength. As to oil, its expansion is about 15 times greater than that of alcohol; it sustains a heat of 600°, and its freezing point is so low that it has not been determined; but its viscosity renders it useless.

Mercury is far superior to alcohol and oil, and is much more manageable than air. 1. As far as the experiments already made can determine, it is of all the fluids hitherto employed in the construction of thermometers, that which measures most exactly equal differences of heat by equal differences of its bulk: its dilatations are, in fact, very nearly proportional to the augmentations of heat applied to it. 2. Of all liquids it is the most easily freed from air. 3. It is fitted to measure high degrees of heat and cold. It sustains a heat of 600° of Fahrenheit's scale, and does not congeal till it fall 39 or 40 degrees below 0. 4. It is the most sensible of any fluid to heat and cold, even air not excepted. Count Rumford found, that mercury was heated from the freezing to the boiling point in 58 seconds, while water took 2 minutes 13 seconds, and common air 10 minutes and 17 seconds. 5. Mercury is a homogeneous fluid, and every portion of it is equally dilated or contracted by equal variations of heat. Any one thermometer, made of pure mercury, is *cæteris paribus*, possessed of the same properties with every other thermometer made of pure mercury. Its power of expansion is indeed about six times less than that of spirit of wine, but it is great enough to answer most of the purposes for which a thermometer is wanted. The fixed points, which are now universally chosen for adjusting thermometers to a scale, and to one another, are the boiling and freezing water points. The boiling water point, it is well known, is not an invariable point, but varies some degrees according to the weight and temperature of the atmosphere. In an exhausted receiver, water will boil with a heat of 98° or 100°; whereas, in Papin's digester, it will acquire a heat of 412°. Hence it appears, that water will boil at a lower point, according to its height in the atmosphere, or to the weight of the column of air which presses upon it. In order to ensure uniformity, therefore, in the construction of thermometers, it is now agreed, that the bulb of the tube be plunged in the water when it boils violently, the barometer standing at 30 English inches, and the temperature of the atmosphere 55°. A thermometer made in this way, with its boiling point at 212°, is called, by Dr. Horsley, Bird's Fahrenheit, because Mr. Bird was the first person who attended to the state of the barometer in constructing thermometers.

As artists may be often obliged to adjust thermometers under very different pressures of the atmosphere, philosophers have been at pains to discover a general rule which might be applied on all occasions. M. de Luc, from a series of experiments, has given an equation for the allowance on account of this difference, in Paris measure, which has been verified by sir George Schuckburg; also Dr. Horsley, Dr. Maskelyne, and sir George Schuckburg, have adapted the equation and rules to English measures, and have reduced the allowances into tables, for the use of the artists. Dr. Horsley's rule, deduced from De Luc's, is this:

$$\frac{99}{8990000} \log. z - 92.804 = h.$$

Where h denotes the height of a thermometer plunged in boiling water above the point of melting ice, in degrees of Bird's Fahrenheit, and z the height of the barometer in 10ths of an inch. From this rule he has computed the following table, for finding the heights to which a good Bird's Fahrenheit will rise, when plunged in boiling water, in all states of the barometer, from 27 to 31 English inches; which will serve, among other uses, to direct instrument-makers in making a true allowance for the effect of the variation of the barometer, if they should be obliged to finish a thermometer at a time when the barometer is above or below 30 inches; though it is best to fix the boiling point when the barometer is at that height.

EQUATION OF THE BOILING POINT.

Barometer.	Equation.	Difference.
31.0	+ 1.57	0.78
30.5	+ 0.79	0.79
30.0	0.00	0.80
29.5	—0.80	0.82
29.0	—1.62	0 83
28.5	—2.45	0.85
28.0	—3.31	0.86
27.5	—4.16	0.88
27.0	—5.04	

The numbers in the first column of this table express heights of the quicksilver in the barometer, in English inches and decimal parts: the second column shows the equation to be applied, according to the sign prefixed, to 212° of Bird's Fahrenheit, to find the true boiling point for every such state of the barometer. The boiling point, for all intermediate states of the barometer, may be had, with sufficient accuracy, by taking proportional parts, by means of the third column of differences of the equations.

The method of constructing Fahrenheit's thermometer, which is now in general use in this country, is the following: a small ball is blown on the end of a glass tube, of an uniform width throughout. The ball and part of the tube are then to be filled with quicksilver, which has been previously boiled to expel the air. The open end of the tube is then to be hermetically sealed. The next object is to construct the scale. It is found, by experiment, that melting snow, or freezing water, is always at the same temperature. If, therefore, a thermometer be immersed in the one or the other, the quicksilver will always stand at the same point. It has been observed, too, that water boils under the same pressure of the atmosphere at the same temperature. A thermometer, therefore, immersed in boiling water, will uniformly stand at the same point. Here, then, are two fixed points, from which a scale may be constructed, by dividing the intermediate space into equal parts, and carrying the same divisions as far above and below the two fixed points as may be wanted. Thus, thermometers constructed in this way may be compared together; for if they are accurately made, and placed in the same temperature, they will always point to the same degree on the scale. The fluid, as we have seen, employed is quicksilver, and it is found to answer best, because its expansions are most equable. The freezing point of Fahrenheit's thermometer is marked 32°, and the reason of this is said to have been, that this artist thought that he had produced the greatest degree of cold, by a mixture of snow and salt; and the point at which the thermometer then stood, in this temperature, was marked Zero. The boiling point, in this thermometer, is 212°, and the intermediate space, between the boiling and freezing points, is therefore divided into 180°. This is the thermometer that is commonly used in Britain.

In determining the choice of tubes it is best to have them exactly cylindric through their whole length. Capillary tubes are preferable to others, because they require less bulbs, and they are also less brittle, and more sensible. Those of the most convenient size for common experiments are such as have their internal diameter about the fourth of a line; and those made of thin glass are better than others, as the rise and fall of the mercury may be more distinctly perceived. The length of nine inches will serve for all common occasions; but for particular purposes the length both of the tubes and of the divisions should be adapted to the uses for which they are designed.

In determining the best size of the balls or bulbs, it has been usual to compare new tubes with such thermometers as are well proportioned. But M. Durand has proposed a formula for finding the proportion which the balls ought to bear to their respective tubes. With this view he expresses the length of the tube, measured in diameters of itself, by a; the whole capacity of the ball and tube by c; the capacity of the fundamental interval, expressed in the same parts with the whole capacity, by d; the number of degrees of the fundamental interval by m; the number of other degrees which the scale is to contain, besides those of the fundamental interval both above and below it, by n; and the diameter of the ball measured in diameters of the tube by b: and $b = \sqrt[3]{\frac{2}{3}a \times \frac{cm}{d \times (m+n)}} - 1$. For two cylinders having equal bases being as their heights, $m : n :: d : \frac{dn}{m}$, which is the capacity of that part of the tube which exceeds the fundamental interval, to which adding d, that interval, we have the total capacity of the tube $= \frac{dn}{m} + d$, or $\frac{dn + dm}{m}$. Subtracting this from c, we shall have the capacity of the ball $= c - \frac{dn + dm}{m} = \frac{cm - dm - dn}{m}$. If this quantity be divided by the capacity of the tube, the quotient will shew how often the capacity of the ball contains that of the tube; and this quotient is $= \frac{cm - dm - dn}{dm + dn}$. Consequently the ball is equal to as many cylinders, having a diameters of the tube, for their respective height, and 1 diameter for the base, as are contained in this last quotient; and, therefore, its cylindric solidity expressed in the cylindric solidities of the tube will be $= a \times \frac{cm - dm - dn}{dm + dn}$. But the diameter of this ball is equal to the base of the cylinder in which it may be inscribed, and the solidity of this cylinder is equal to $\frac{2}{3}$ the solidity of the circumscribing sphere. Consequently the solidity of this cylinder will be $= \frac{2}{3} a \times \frac{cm - dm - dn}{dm + dn}$; and the diameter of its base, equal to the diameter of the ball, will be $= \sqrt[3]{\frac{2}{3} a \times \frac{cm - dm - dn}{dm + dn}}$

$$= \sqrt[3]{\frac{2}{3} a \times \frac{cm}{d \times (m + n)}} - 1.$$

Two unalterable points of temperature, viz. the former where ice becomes water, and the second where water becomes vapour, have been universally adopted by the various constructors of thermometers for the graduation of those instruments; but the space between them has been divided differently by different persons, and this difference gives the different names of thermometers, or rather of their graduations; such as Reaumur's thermometer, Fahrenheit's thermometer, &c. Reaumur divides the space between the above-mentioned two points, into 80 equal parts or degrees; placing the 0 at freezing, and the 80th degree at the boiling point. Fahrenheit, as above remarked, divides it into 180 degrees or equal parts, but he places the 0 thirty-two degrees below the freezing point D; so that the freezing point is at 32, and the boiling point E is at 212 degrees.

Other persons have adopted other divisions, which have been suggested by supposed advantages or fanciful ideas.

Most of those graduations are at present out of use, but they are to be met with in various, not very recent, publications; we have therefore thought it necessary to set them down in the following table, which contains: 1st. The name of the person or society that has used each particular division: 2dly. The degree which has been placed, by each of them, against the freezing-point; 3dly. The degree which has been placed against the boiling-point; and, 4thly. The number of degrees lying between those two points.

	Freezing point.	Boiling point.	Deg. between the preceding two points.
Fahrenheit's, which is generally used in Great Britain. It is also used throughout this work, unless some other is mentioned	32	212	180
Reaumur's, which is generally used in France and other parts of the Continent	0	80	80
Celsius's, which has been used chiefly in Sweden, hence it is also called the Swedish thermometer. It has been lately adopted by the French chemists, under the name of centigrade thermometer	0	100	100
The Florentine thermometers, which were made and used by the members of the famous academy *del' Cimento*, being some of the first instruments of the sort, were vaguely graduated, some having a great many more degrees than others. But two of their most common graduations seem to be	20 $13\frac{1}{2}$	174 $81\frac{2}{3}$	154 $68\frac{1}{6}$
The Parisian thermometer, viz. the *ancienne thermometre* of the Academy of Sciences, seems to have been graduated nearly thus,	25	239	214
De la Hire's thermometer, which stood in the observatory at Paris above 60 years, was graduated thus,	28	$199\frac{1}{3}$	$171\frac{1}{3}$
Amanton's	$51\frac{1}{2}$	73	$21\frac{1}{2}$
Poleni's	$47\frac{3}{10}$	$62\frac{9}{10}$	$15\frac{6}{10}$
De L'Isle's thermometer is graduated in an inverted order	150	0	150
Sir Isaac Newton's	0	34	34
Hales's	0	163	163
The Edinburgh thermometer, formerly used, seems to have been graduated thus,	$8\frac{1}{5}$	47	$38\frac{4}{5}$

These are the chief thermometers that have been used in Europe; and the temperatures indicated by the principal of them may be reduced into the corresponding degrees on any of the others, by means of the following simple theorems; in which R signifies the degrees on the scale of Reaumur, F those of Fahrenheit, and S those of the Swedish thermometer.

1. To convert the degrees of Reaumur into those of Fahrenheit; $\frac{R \times 9}{4} + 32 = F$.

2. To convert the degrees of Fahrenheit into those of Reaumur; $\frac{(F - 32) \times 4}{9} = R$.

3. To convert the Swedish degrees into those of Fahrenheit; $\frac{S \times 9}{5} + 32 = F$.

4. To convert Fahrenheit's into Swedish; $\frac{(F - 32) \times 5}{9} = S$.

5. To convert Swedish degrees into those of Reaumur; $\frac{S \times 4}{5} = R$.

6. To convert Reaumur's degrees into Swedish; $\frac{R \times 5}{4} = S$.

To such readers as are unacquainted with the algebraic expression of arithmetical formulæ, it will be sufficient to express one or two of these in words, to explain their use: 1. Multiply the degree of Reaumur by 9, divide the product by 4, and to the quotient add 32, the sum expresses the degree on the scale of Fahrenheit. 2. From the degree of Fahrenheit subtract 32, multiply the remainder by 4, and divide the product by 9, the quotient is the degree according to the scale of Reaumur, &c.

In meteorological observations, it is necessary to attend to the greatest rise and fall of the thermometer, and therefore attempts have been made to make them mark the greatest degree of heat and cold, in the absence of the observer. We will notice one, intended to show the greatest degree of heat. AB, fig. 3. is a glass tube, with a cylindrical bulb, B, at the lower end, and capillary at the other, over which there is a fixed glass ball, C. The bulb, and part of the tube, are filled with mercury, the top of which shows the degrees of heat. The upper part of the tube, above the mercury, is filled with spirit of wine; the ball, C, is likewise filled with the same liquor, almost to the top of the capillary tube. When the mercury rises, the spirit of wine is also raised into the ball, C, which is so made that the liquor cannot return into the tube when the mercury sinks; of course, the height of the spirit in the ball, added to that in the tube, will give the greatest degree of heat. To make a new observation, the instrument must be inclined till the liquor in the ball cover the end of the capillary tube.

In 1782, Mr. Six proposed another self-registering thermometer. It is properly a spirit of wine thermometer, though mercury is also employed for supporting an index: *ab* (fig. 4.) is a thin tube of glass sixteen inches long, and five-sixteenths of an inch calibre: *cde*, and *fgh*, are smaller tubes, about one-twentieth of an inch calibre. These three tubes are filled with highly rectified spirit of wine, except the space between *d* and *g*, which is filled with mercury. As the spirit of wine contracts or expands in the middle tube, the mercury falls or rises in the outside tubes. An index, such as that represented in fig. 5, is placed on the surface, within each of these tubes, so light as to float upon it: *k* is a small glass tube, three-fourths of an inch long, hermetically sealed at each end, and inclosing a piece of steel wire nearly of its own length. At each end, *lm*, of this small tube, a short tube of black glass is fixed, of such a diameter as to pass freely up and down within either of the outside tubes of the thermometer, *ce*, or *fh*. From the upper end of the index is drawn a spring of glass to the fineness of a hair, and about five-sevenths of an inch long; which, being placed a little oblique, presses lightly against the inner surface of the tube, and prevents the index from descending when the mercury descends. These indexes being inserted one into each of the outside tubes, it is easy to understand how they point out the greatest heat or cold that has happened in the observer's absence. When the spirit of wine in the middle tube expands, it presses down the mercury in the tube, *hf*, and consequently raises it in the tube, *eo*; consequently, the index on the left hand tube is left behind, and marks the greatest cold, and the index in the right hand tube rises, and marks the greatest heat.

The common contrivance for a self-registering thermometer, now sold in most of the London shops, consists simply of two thermometers, one mercurial, and the other of alcohol, (fig. 6.) having their stems horizontal; the former has for its index a small bit of magnetical steel wire, and the latter a minute thread of glass, having its two ends formed into small knobs, by fusion in the flame of a candle.

The magnetical bit of wire lies in the vacant space of the mercurial thermometer, and is pushed forward by the mercury whenever the temperature rises, and pushes that fluid against it; but when the temperature falls, and the fluid retires, this index is left behind, and consequently shows the maximum. The other index, or bit of glass, lies in the tube of the spirit thermometer immersed in the alcohol: and when the spirit retires, by depression of temperature, the index is carried along with it, in apparent contact with its interior surface; but, on increase of temperature, the spirit goes forward and leaves the index, which therefore shows the minimum of temperature since it was set. As these indexes merely lie in the tubes, their resistance to motion is altogether inconsiderable. The steel index is brought to the mercury by applying a magnet on the outside of the tube, and the other is duly placed at the end of the column of alcohol, by inclining the whole instrument.

For an account of Mr. Keith's self-registering thermometers, see Gregory's Mechanics, vol. ii. and Nicholson's Journal, vol. iii. 4to series.

Mr. Professor Leslie, the well-known author of a curious and interesting treatise on heat, invented a thermometer for indicating and measuring very minute differences of temperature. It is called the differential thermometer. It consists of two tubes, each terminating in a small bulb of the same dimensions, joined by the blowpipe, and bent in the form of a U, a small portion of dark coloured liquor having previously been introduced into one of the balls. The fluid best adapted to the purpose is found to be a solution of carmine in concentrated sulphuric acid. By managing the included air with the heat of the hand, this red liquor is made to stand at the required point of the opposite tube. This is the zero of a scale fastened to that tube, and divided into equal parts above and below that point. The instrument is then fixed on a stand. It is manifest that when the liquor is at rest, or points at zero, the column is pressed in opposite directions by two portions of air equal in elasticity and containing equal portions of caloric. Whatever heat, therefore, may be applied to the whole instrument, provided both bulbs receive it in the same degree, the liquor must remain at rest. But if the one ball receives the slightest excess of temperature, the air which it contains will be proportionally expanded, and will push the liquid against the air in the other bulb with a force varying as the difference between the temperatures of those two portions of air: thus the equilibrium will be destroyed, and the fluid will rise in the opposite tube. The degrees of the scale through which it passes will mark the successive augmentations in the temperature of the ball which is exposed to the greatest heat; so that this instrument is a balance of extreme delicacy for comparing the temperatures of its two scales.

When thermometers are contrived to measure very great degrees of heat by the expansions they produce in substances, or, on the contrary, the expansions corresponding to different temperatures, they are characterised by the name of pyrometers; descriptions of the principal of them may be seen under the word **Pyrometer** in this work.

THERMOME'TRICAL. *a.* (from *thermometer.*) Relating to the measure of heat (*Cheyne*).

THERMOPYLÆ, a small pass leading from Thessaly into Locris and Phocis. It receives its name from the hot baths which are in the neighbourhood. It is celebrated for a battle which was fought there, B. C. 480, on the 7th of August, between Xerxes and the Greeks, in which 300 Spartans resisted for three successive days repeatedly the attacks of the most brave and courageous of the Persian army, which, according to some historians, amounted to five millions. There was also another battle fought there between the Romans and Antiochus, king of Syria.

THERMOSCO'PE. (θερμος and σκοπεω.) An instrument showing the changes happening in the air with respect to heat and cold. The word thermoscope is generally used indifferently with that of thermometer, though there is some difference in the literal import of the two; the first signifying an instrument that shows, or exhibits, the changes of heat, &c. to the eye: and the latter, an instrument that measures those changes; on which foundation the thermometer should be a more accurate thermoscope, &c.

THERPANDER, a celebrated poet and musician of Lesbos, about 650 years before the Christian era, who several times obtained the prize in the different musical contests of the Greeks. He was fined by the Ephori at Lacedæmon, because he had added one string more to the lyre. His poetical compositions are lost.

THERSITES, an officer the most deformed and illiberal of the Greeks, during the Trojan war. He was fond of ridiculing his fellow soldiers, particularly Agamemnon, Achilles, and Ulysses. Achilles killed him with one blow of his fist, because he laughed at his mourning the death of Penthesilea.

THESE. *pro.* The plural of *this.* 1. Opposed to *those* (*Dryden*). 2. *These* relates to the persons or things last mentioned; and *those* to the first (*Woodward*).

THESEIS, a poem written by Codrus, containing an account of the life and actions of Theseus, and now lost. (*Juv.*)

THESEUS, king of Athens, and son of Ægeus by Æthra, the daughter of Pittheus, was one of the most celebrated of the heroes of antiquity. He was educated at Trœzene, in the house of Pittheus. When he came to the years of maturity, he was sent by his mother to his father, and a sword was given him, by which he might make himself known to Ægeus. (See ÆGEUS.) In his way from Trœzene to Athens, he destroyed Corynetes, Synnis, Sciron, Cercyon, Procustes, and the celebrated Phæa. At Athens, however, his reception was not cordial; Medea lived there with Ægeus, and she attempted to destroy him before his arrival was made public. Ægeus was himself to give the poison to his son at a feast, but the sight of his sword on the side of Theseus reminded him of his amours with Æthra. He knew him to be his son, and the people of Athens were glad to find that Theseus was the son of their monarch. The Pallantides who attempted to assassinate Theseus were all put to death by the young prince. The bull of Marathon next engaged the attention of Theseus. He caught the animal alive, and after he had led it through the streets of Athens, he sacrificed it to Minerva. After this Theseus went to Crete, where, by means of Ariadne, who was enamoured of him, he killed the Minotaur, (See MINOTAURUS) and thereby redeemed the Athenians from the annual tribute of the seven chosen youths devoured by this monster. In the island of Naxos he had the meanness to abandon Ariadne, to whom he was indebted for his safety. Ægeus, at his return to Athens, threw himself into the sea, when he saw his son's ship, with black sails, which was the signal of ill success. His ascension on his father's throne was universally applauded, B. C. 1235. The Athenians were governed with mildness, and Theseus made new regulations, and enacted new laws. The fame which he had gained by his victories and policy made Pirithous, king of the Lapithæ, desirous of gaining his friendship, by meeting him in the field. He invaded Attica, and when Theseus had marched out to meet him, the two enemies, struck at the sight of each other, rushed to embrace one another in the most cordial manner, and from that time began a friendship which has become proverbial. Theseus was present at the nuptials of his friend, and he was the most courageous of the Lapithæ, in the defence of Hippodamia against the brutal attempts of the Centaurs. Theseus, after this, in conjunction with Pirithous, carried off Helen, the daughter of Leda, but the resentment of Castor and Pollux soon obliged him to restore her safe into their hands. Some time after Theseus assisted his friend in procuring a wife, and they both descended into the infernal regions to carry away Proserpine. Pluto, apprized of their intentions, stopped them. Pirithous was placed on his father's wheel, and Theseus was tied to a huge stone, on which he had sat to rest himself. Virgil represents him in an eternal state of punishment. Apollodorus, however, and others declare, that he was not long detained in hell; when Hercules came to steal the dog Cerberus, he redeemed both him and Pirithous. During the captivity of Theseus in the kingdom of Pluto, Mnestheus obtained the crown in preference to the children of the absent monarch. At his return, Theseus attempted to eject the usurper, but to no purpose. He retired with great mortification to the court of Lycomedes, king of the island of Scyros, who, either jealous of his fame, or bribed by the presents of Mnestheus, carried him to a high rock, on pretence of shewing him the extent of his dominions, and threw him down a deep precipice. The children of Theseus, after the death of Mnestheus, recovered the Athenian throne. The historians disagree from the poets in their accounts about this hero, and they all suppose, that instead of attempting to carry away the wife of Pluto, the two friends wished to seduce a daughter of Aidoneus, king of the Molossi.

THE′SIS. *s.* (*these*, Fr. θεσις.) A position; something laid down affirmatively or negatively (*Prior*).

THESIUM. Base fluellin. In botany, a genus of the class pentandria, order monogynia. Calyx one-leafed, bearing the stamens; corolless; seed one, inferior, covered with a bark. Nineteen species, almost all natives of the Cape, one of them a tree of middling height. One species is common to our own country, and found wild in our chalk-soils, thesium linophyllum, or bastard toad-flax, with branched spikes, and linear leaves: it flowers in June and July.

THESMOPHORA, a sirname of Ceres, as lawgiver, in whose honour festivals were instituted called Thesmophoria. The Thesmophoria were instituted by Triptolemus, or according to some by Orpheus, or the daughter of Danaus. The greatest part of the Grecian cities, especially Athens, observed them with great solemnity. For the manner of celebrating these festivals, the reader is referred to Potter's Antiquities or Lempriere's Classical Dictionary.

THESMOTHETÆ, a name given to the last six Archons among the Athenians, because they took particular care to enforce the laws, and to see justice impartially administered. They were at that time nine in number.

THESPIS, a Greek poet of Attica, supposed by some to be the inventor of tragedy, 536 years before Christ. His representations were very rustic and imperfect. He went from town to town upon a cart, on which was erected a temporary stage, where two actors, whose faces were daubed with the lees of wine, entertained the audience with choral songs, &c.

THESPIUS, or THESTIUS, a king of Thespia, in Bœotia, was desirous that his fifty daughters should have children by Hercules, and therefore when that hero was at his court he permitted him to enjoy their company. This, which according to some was effected in one night, passes for the 13th and most arduous of the labours of Hercules. All the daughters of Thespius brought male children into the world, and some of them twins. The children of the Thespiades, called Thespiadæ, went to Sardinia, where they made a settlement with Iolaus, the friend of their father. (*Apollod. Paus. Plut.*)

THESPROTIA, a country of Epirus, west of Ambracia, bounded on the south by the sea. It is watered by the rivers Acheron and Cocytus, which the poets, after Homer, have called streams of hell. The oracle of Dodona was in Thesprotia. (*Homer. Strab.*)

THESSALONIANS (Paul's Epistles to the). The first of these is allowed to have been one of the earliest written of all St. Paul's epistles. This, and the second epistle to the Thessalonians, were, there is good reason to conclude, written about A. D. 52. See EPISTLE.

This epistle is addressed to the Christian inhabitants of Thessalonica, a large populous city (first called Therma, but named Thessalonica after Cassander's wife of the same name), the metropolis of Macedonia. In this city the Christian religion was planted by Paul and Silas soon after they left Philippi, where they met with very unworthy treatment. (Acts xvi. 24. 1 Thess. ii. 20.) At first they preached with much success, but the Jews raised such a tumult that the Apostle was obliged to leave them abruptly. (Acts xvii. 1—14.) As he had left his friends there, on his, as well as their own account, he sent Timothy to them from Athens, to confirm and comfort them. Timothy at his return found the Apostle removed to Corinth, where he continued two years. (Acts xviii. &c.)

The Apostle's design in this epistle is in general to confirm the Thessalonians in their adherence to the Christian faith, and to engage them, from the sufferings they had already endured in that cause, and the extraordinary character they had hitherto maintained, to make still greater advances in religion, and become yet more eminent in every branch of the Christian temper.

THESSALONIANS (The second Epistle to the), appears to have been written soon after the first, and at the same place.

The general design of it, like the former, is to confirm the Thessalonians in their Christian profession, and to comfort them under the sufferings to which they were exposed. Besides which the Apostle sets himself to rectify some mistaken apprehensions they seem to have entertained about the coming of Christ; and to direct them in the exercise of Christian discipline towards some irregular members of the society.

THESSALONICA. See THESSALONIANS.

THESSALY, a country of Greece, whose boundaries have been different at different periods. Properly speaking, Thessaly was bounded on the south by the southern parts of Greece, or Græcia Propria; east by the Ægean; north by Macedonia and Mygdonia; and west by Illyricum and Epirus. It was generally divided into four separate provinces, Thessaliotis, Pelasgiotis, Istiæotis, and Phthiotis, to which some add Magnesia. It has been severally called Æmonia, Pelasgicum, Argos, Hellas, Argeia, Dryopis, Pelasgia, Pyrrhæa, &c. The name of Thessaly is derived from Thessalus, one of its monarchs. Thessaly is famous for a deluge which happened there in the age of Deucalion. Its mountains and cities are also celebrated, such as Olympus, Pelion, Ossa, Larissa, &c. The Argonauts were partly natives of Thessaly.

THETFORD, a borough in Norfolk, governed by a mayor, with a market on Saturday. It is seated on the Little Ouse, which here divides Suffolk from Norfolk, and is navigable from Lynn. It has three parish-churches, one of which is on the Norfolk side of the river, and a considerable manufacture of woollen cloth and paper. The spring assizes for the county are held here. It is 30 miles S.S.E. of Lynn, and 80 N.E. of London. Lon. 0. 50 E. Lat. 52. 28 N.

THETIS, one of the sea deities, daughter of Nereus and Doris, was courted by Neptune and Jupiter; but when the gods were informed that the son she should bring forth must become greater than his father, their addresses were stopped, and Peleus, the son of Æacus, was permitted to solicit her hand. Thetis refused him, but the lover had the artifice to catch her when asleep. When Thetis found that she could not elude the vigilance of her lover, she consented to marry him. Their nuptials were celebrated on mount Pelion, with great pomp; and all the deities attended except the goddess of discord. (See DISCORDIA.) Thetis became mother of several children by Peleus, among whom was Achilles, whom she rendered invulnerable by plunging him in the waters of the Styx, except that part of the heel by which she held him.

THEVENOT (Melchisedec), librarian to the king of France, and a celebrated writer of travels, was born at Paris in 1621, and had scarcely gone through his academical studies, when he discovered a strong passion for visiting foreign countries. At first he saw only part of Europe; but then he took great care to procure very particular informations and memoirs from those who had travelled over other parts of the globe, and out of those composed his Voyages and Travels.—He laid down, among other things, some rules, together with the invention of an instrument, for the better finding out of the longitude, and the declination of the needle; and some have thought that these are the best things in his works, since travels, related at second-hand, can never be thought of any great authority or moment; not but Thevenot travelled enough to relate some things upon his own knowledge. Another passion in him, equally strong with that for travelling, was to collect scarce books in all sciences, especially in philosophy, mathematics, and history; and in this he may be said to have spent his whole life. When he had the care of the king's library, though it was one of the best furnished in Europe, he found 2000 volumes wanting in it which he had in his own. Besides printed books, he bought a great many manuscripts in French, English, Spanish, Italian, Latin, Greek, Hebrew, Syriac, Arabic, Turkish, and Persic. The marbles presented to him by Mr. Nointel, at his return from his embassy to Constantinople, upon which there are bas-reliefs and inscriptions almost 2000 years old, may be reckoned among the curiosities of his library. He spent most of his time among his books, without aiming at any post of figure or profit: he had, however, two honourable employments; for he assisted at a conclave held after the death of pope Innocent X. and was the French king's envoy at Genoa. He was attacked with what is called a slow fever in 1692, and died October the same year, at the age of 71. According to the account given, he managed himself very improperly in this illness; for he diminished his strength by abstinence, while he should have increased it with hearty food and generous wines, which were yet the more necessary on account of his great age.—Thevenot's Travels into the Levant, &c. were published in English in the year 1687, folio; they had been published in French at Paris 1663, folio. He wrote also L'Art de Nager, the Art of Swimming, 12mo. 1696.

THEURGY, θεουργια, a name which the ancients gave to that sacred part of magic which we sometimes call white magic, or the white art. The word is formed from Θεος, God, and εργον, work; *q. d.* the art of doing divine things, or things which God alone can do: or the power of working extraordinary and supernatural things, by invoking the names of God, saints, angels, &c. Accordingly, those who have written of magic in general divide it into three parts: the first whereof is called theurgy, as operating by divine or celestial means; the second, natural magic, performed by the powers of nature; and the third, comprehending necromancy, sorcery, and witchcraft or magic, performed by the assistance of demons or departed men. See MAGIC.

THEW. *s.* (ðeaƿ, Sax.) 1. Quality; manners: obsolete (*Spenser*). 2. In *Shakspeare* it seems to signify brawn, or bulk, from the Saxon ðeoƿ, the thigh.

THEWED. *a.* (from *thew.*) Educated; habituated; accustomed: obsolete (*Spenser*).

THEY. *pro.* In the oblique case *them*, the plural of *he* or *she*. (ði, Saxon.) 1. The men; the women; the persons (*Shakspeare*). 2. Those men; those women: opposed to some others (*Prior*). 3. (The plural of *this*, *that*, or *it*.) The things (*Prior*).

THIBET. See TIBET.

THI'BLE. *s.* A slice; a scummer; a spatula (*Ainsworth*).

THICK. *a.* (ðicce, Sax. *thickur*, Islandic.) 1. Not thin. 2. Dense; not rare; gross; crass (*Arbuthnot*). 3. Not clear; not transparent; muddy; feculent (*Temple*). 4. Great in circumference; not slender (*Deut.*). 5. Deep; noting the third dimension: as a plank four feet long, two feet broad, and five inches *thick*. 6. Noting comparative bulk: as, the door was three inches *thick*. 7. Frequent; in quick succession; with little intermission (*Wotton*). 8. Close; not divided by much space; crowded (*Addison*). 9. Not easily pervious; set with things close to each other (*Dryden*). 10. Coarse; not thin (*Bacon*). 11. Without proper intervals of articulation (*Shakspeare*).

THICK. *s.* (from the adjective.) 1. The thickest part, or time when any thing is thickest (*Knolles*). 2. A thicket; a place full of bushes (*Drayton*). 3. THICK and *thin.* Whatever is in the way (*Hudibras*).

THICK. *ad.* 1. Frequently; fast (*Denham*). 2. Closely (*Norris*). 3. To a great depth (*Addison*). 4. THICK *and threefold.* In quick succession; in great numbers (*L'Estrange*).

To THI'CKEN. *v. a.* (from *thick.*) 1. To make thick. 2. To make close; to fill up interstices (*Woodward*). 3. To condense; to make to concrete (*Arbuthnot*). 4. To strengthen; to confirm (*Shakspeare*). 5. To make frequent. 6. To make close or numerous.

To THI'CKEN. *v. n.* 1. To grow thick. 2. To grow dense or muddy (*Shakspeare*). 3. To concrete; to be consolidated (*Prior*). 4. To grow close or numerous (*Tatler*). 5. To grow quick (*Addison*).

THI'CKET. *s.* (ðiccezu, Sax.) A close knot or tuft of trees; a close wood or copse (*Shakspeare*).

THI'CKLY. *ad.* (from *thick.*) 1. Deeply; to a great quantity (*Boyle*). 2. Closely; in quick succession.

THI'CKNESS. *s.* (from *thick.*) 1. The state of being thick; density. 2. Quantity of matter interposed; space taken up by matter interposed (*Boyle*). 3. Quantity laid on quantity to some considerable depth (*Bacon*). 4. Consistence; grossness; not rareness: spissitude (*Bacon*). 5. Imperviousness; closeness (*Addison*). 6. Want of sharpness; want of quickness (*Holder*).

THI'CK-SCULLED. *a.* Dull; stupid.

THI'CKSET. *a.* (*thick* and *set.*) Close planted (*Grew*).

THI'CKSKIN. *s.* (*thick* and *skin.*) A coarse gross man; a numskull (*Shakspeare*).

THIEF. *s.* (ðeiꝼ, Sax. *dief*, Dutch.) 1. One who takes by secrecy what belongs to another (*John*). 2. An excrescence in the snuff of a candle (*May*).

THIEF-CATCHER. THIEF-LEADER. THIEF-TAKER. *s.* (*thief* and *catch, lead, take.*) One whose business is to detect thieves (*Brampton. L'Estrange*).

To THIEVE. *v. n.* (from *thief.*) To steal; to practise theft.

THI'EVERY. *s.* (from *thieve.*) 1. The practice of stealing; theft (*South*). 2. That which is stolen (*Shakspeare*).

THI'EVISH. *a.* (from *thief.*) 1. Given to stealing; practising theft (*Addison*). 2. Secret; sly; acting by stealth (*Shakspeare*).

THI'EVISHLY. *ad.* Like a thief (*Tusser*).

THI'EVISHNESS. *s.* (from *thievish.*) Disposition to steal; habit of stealing.

THIGH. *s.* (ðeoh, Sax. *thies*, Islan.) The *thigh* includes all between the buttocks and the knee. The *thigh* bone is the longest of all the bones in the body.

THILK. *pro.* (ðilc, Sax.) That same: obsolete (*Spenser*).

THILL. *s.* (ðille, Saxon.) The shafts of a waggon; the arms of wood between which the last horse is placed (*Mortimer*).

THILL-HORSE. THI'LLER. *s.* (*thill* and *horse.*) The last horse; the horse that goes between the shafts (*Tusser. Shakspeare*).

THI'MBLE. *s.* (from *thumb bell. Minshew.*) A metal cover by which women secure their fingers from the needle (*Shakspeare*).

The art of thimble-making was brought from Holland, in 1695, by Mr. John Lofting, a Dutchman, who set up a workshop at Islington, and practised it with success. Thimbles are made of shruff, or old hammered brass, the best being too dear and the ordinary too brittle. This the manufacturers melt and cast in a sort of sand, with which and red ocre are made mould and cores, and in them they usually cast six gross at a cast, and about six or seven of these casts in a day. They are cast in double rows, and, when cold, taken out and cut off with greasy shears. Then boys take out the cores from the inside with a pointed piece of iron, which cores were made by them, every core having a nail with a broad head in it, which head keeps it from the mould, and makes the hollow to cast it in. This done, they are put into a barrel as they do shot, and turned round with a horse, till they rub the sand one from another. Thus far the foundery, in which are employed six persons: first, the founder and two men make the moulds ready. Secondly, two boys make cores, for each thimble one. Thirdly, one that blows the bellows From hence they are carried to the mill to be turned. First, the inside, which works with an instrument to the bottom, while its hold lasts, and flies back when let loose. Secondly, the outside, which with a coarser engine, called a rough turning, is made pretty smooth at one stroke; and afterwards with a finer engine both the side and bottom are at one stroke made very smooth. Then some saw-dust or filings of horn combs are put half way into each thimble, and upon it an iron punch, and then, with one blow against a studded steed, the hollow of the bottom is made. After this, with an engine, the sides have the hollow made, and in this engine is their chief secret, and they can work off with it thirty or forty gross in a day. This done, they are again polished on the inside. Then the rim, whether a single or double one, is turned at one stroke, and all these turnings are performed with five men and three boys. After this, they are again turned in the barrel with saw-dust or bran, to scour them very bright, and so they are complete thimbles. Thus finished, they are sorted, and put six together one in another; and six of these half dozens are wrapped up in a blue paper; and four of these papers, making a gross, are wrapped up in another paper, and tied with a packthread, which makes them almost a square, and are sold by the first maker by the gross.

THIME. *s.* (*thymus*, Latin; *thym*, Fr.) A fragrant herb: properly *thyme* (*Spenser*).

THIN. *a.* (ðinn, Saxon; *thunner*, Islan.) 1. Not thick (*Exodus*). 2. Rare; not dense (*Bacon*). 3. Not close; separate by large spaces (*Roscommon*). 4. Not closely compacted or accumulated (*Genesis*). 5. Exile; small (*Dryden*). 6. Not coarse; not gross in substance. 7. Not abounding (*Addison*). 8. Not fat; not bulky; lean; slim (*L'Estrange*).

THIN. *ad.* Not thickly (*Milton*).

To THIN. *v. a.* (from the adjective.) 1. To make thin or rare; to make less thick (*Arb.*). 2. To make less close or numerous (*Dryden*). 3. To attenuate (*Blackmore*).

THINE. *pronoun.* (*thein*, Gothic; ðin, Sax.) Belonging or relating to thee; the pronoun possessive of *thou*. It is used for *thy* when the substantive is divided from it: as, *this is* thy *house*; *this house is* thine.

THING. *s.* (ðinȝ, Saxon; *ding*, Dutch.) 1. Whatever is; not a person (*Shakspeare*). 2. It is used in contempt (*Swift*). 3. It is used of persons in contempt, or sometimes with pity (*Shakspeare. Congreve*). 4. It is used by *Shakspeare* once in a sense of honour.

To THINK. *v. n.* pret. *thought.* (*thankgan*, Gothic; ðencean, Saxon.) 1. To have ideas; to compare terms or things; to reason; to cogitate (*Dryden*). 2. To judge; to conclude (*Daniel*). 3. To intend (*Shakspeare*). 4. To imagine; to fancy (*Burnet*). 5. To muse; to meditate (*Dryden*). 6. To recollect; to observe (*Shakspeare*). 7. To judge; to be of opinion (*Swift*). 8. To consider; to doubt (*Bentley*). 9. *To* THINK *on.* To contrive; to light upon by meditation (*Swift*). 10. *To* THINK *of.* To estimate (*Locke*).

To THINK. *v. a.* 1. To imagine; to imagine in the mind; to conceive (*Shakspeare*). 2. To believe; to esteem (*Milton*). 3. *To* THINK *much.* To grudge (*Milton*). 4. *To* THINK *scorn.* To disdain (*Esther*).

THI'NKER. *s.* (from *think.*) One who thinks in a certain manner (*Locke*).

THINKING, a general name for any act or operation of the mind. When the mind turns to view inwards upon itself, the first idea that offers, says Mr. Locke, is thinking, wherein it observes a great variety of modifications, and thereof frames to itself distinct ideas. Thus, the perception annexed to an impression on the body made by an external object is called sensation. When an idea recurs, without the presence of the object, it is called remembrance. When sought after by the mind, and brought again to view, it is called recollection. When held long there under attentive consideration, it is contemplation. When ideas float in the mind with regard or reflection, it is called a reverie; when they are taken express notice of, and as it were registered in the memory, it is called attention; and when the mind fixes its view on any one idea, and considers it on all sides, it is study and intention. These are the most obvious modes of thinking; but there are several others yet, and, doubtless, the mind is capable of infinite others, which we have no notion at all of.

THI'NLY. *ad.* (from *thin.*) 1. Not thickly. 2. Not closely; not numerously (*Dryden*).

THI'NNESS. *s.* (from *thin.*) 1. The contrary to thickness; exility; tenuity (*Newton*). 2. Paucity; scarcity (*Dryden*). 3. Rareness; not spissitude (*South*).

THIRD. *a.* (ðꞃıðða, Saxon.) The first after the second; the ordinal of three.

THIRD. *s.* (from the adjective.) 1. The third part (*Addison*). 2. The sixtieth part of a second (*Holder*).

THIRD, in music, an interval so called because it contains three diatonic sounds.

The Greeks not admitting the third as a consonance, it obtained no general name amongst them; but took that of the lesser or greater interval from which it was formed.

There are four species of thirds: two consonant, and two dissonant. The consonants are, first, the major-third, called by the ancients ditone, composed of two tones; secondly, the minor-third, called hemiditone, consisting of a tone and a half. The dissonant-thirds are, first, the diminished-third, composed of two major-semitones; secondly, the superfluous-third, composed of two tones and a half.

This last interval, not having place in the same mode, or key, is never used either in harmony, or in melody. The Italians sometimes introduce the diminished-third in airs, but it is never used in harmony.

The consonant-thirds are the spirit of harmony, particularly the major-third, which is sonorous and brilliant; the minor-third is more tender, and even pathetic; a difference of character from which skilful composers derive some of the best and most poignant effects.

The old French theorists had almost as severe laws respecting the thirds as we now observe in regard to fifths and eighths. It was by them forbidden to have two in immediate succession even of different kinds, particularly in the same direction.

THIR'DBOROUGH. *s.* (*third* and *borough.*) An under constable.

THI'RDLY. *ad.* In the third place (*Bacon*).

To THIRL. *v. a.* (ðıꞃlıan, Saxon.) To pierce; to perforate: now *thrill* (*Ainsworth*).

THIRST. *s.* (ðýꞃꞅꞇ, Saxon; *dorst*, Dutch.) 1. The pain suffered for want of drink; want of drink (*Arbuthnot*). 2. Eagerness; vehement desire (*Fairfax*). 3. Drought (*Milton*).

To THIRST. *v. n.* (ðýꞃꞅꞇan, Saxon.) 1. To feel want of drink; to be thirsty or athirst (*Milton*). 2. To have a vehement desire for any thing (*Locke*).

To THIRST. *v. a.* To want to drink (*Prior*).

THI'RSTINESS. *s.* (from *thirst.*) The state of being thirsty (*Wotton*).

THI'RSTY. *a.* (ðuꞃꞅꞇıᵹ, Saxon.) 1. Suffering want of drink; pained for want of drink (*Rowe*). 2. Possessed with any vehement desire: as, *blood* thirsty.

THIRTE'EN. *a.* (ðꞃeoꞇıne, Saxon.) Ten and three.

THIRTE'ENTH. *a.* (from *thirteen*, ðꞃeoꞇeoða, Sax.) The third after the tenth.

THIRTEENTH. An interval forming the octave of the sixth, or the sixth of the octave. It contains twelve diatonic degrees; i. e. thirteen sounds.

THI'RTIETH. *a.* (from *thirty*, ðꞃıꞇꞇeᵹoða, Saxon.) The tenth thrice told.

THIRSK, or THURSK, a borough in the N. riding of Yorkshire, with a market on Monday. It sends two members to parliament; and was formerly noted for its strong castle. It is 20 miles N.W. of York, and 230 N. by W. of London. Lon. 1. 16 W. Lat. 54. 15 N.

THI'RTY. *a.* (ðꞃıꞇꞇıᵹ, Saxon.) Thrice ten.

THIS. *pronoun.* (ðıꞅ, Saxon.) 1. That which is present; what is now mentioned (*Shakspeare*). 2. The next future (*Genesis*). 3. *Tkis* is used for *this time* (*Dryden*). 4. The last past (*Dryden*). 5. It is often opposed to *that* (*Pope*). 6. When *this* and *that* respect a former sentence, *this* relates to the latter, *that* to the former member. See THOSE (*Hooker*). 7. Sometimes it is opposed to *the other* (*Dryden*).

THI'STLE. *s.* (ðıꞅꞇel, Saxon.) A prickly weed growing in corn fields. See CORDUUS.

THISTLE (Carline). See CHAMELEON ALBUM.

THISTLE (Holy). See CARDUUS BENEDICTUS.

THISTLE (Pine). See CARLINA GUMMIFERA.

THISTLE (Globe). See ECHINOPS.

THISTLE (Melon). See CACTUS.

THISTLE (Torch). See CACTUS.

THISTLE (Order of the), or of St. Andrew, a military order of knighthood in Scotland, the rise and institution of which is variously related by different authors. Lesley bishop of Ross reports, that the night before the battle between Athelstan king of Northumberland and Hungus king of the Picts, a bright cross, in form of that whereon St. Andrew (the tutelar saint of Scotland) suffered martyrdom, appeared to Hungus; who having gained the victory, ever after bore the figure of that cross on his banners. Others assert, that Achaius king of Scotland first instituted this order, after having made the famous league offensive and defensive with Charlemagne king of France. But although the thistle had been acknowledged as the symbol of the kingdom of Scotland from the reign of Achaius, yet some refer the beginning of this order to Charles VII. of France. Others place the foundation of it as low as the year 1500.

The chief and principal ensign is a gold collar composed of thistles and sprigs of rue interlinked with amulets of gold, having pendent thereunto the image of St. Andrew with his cross, and the motto *Nemo me impune lacesset*; "Nobody shall provoke me unpunished."

The ordinary or common ensign worn by the knights is a star of four silver points, and over them a green circle bordered and lettered with gold, containing the said motto, and in the centre is a thistle proper; all which is embroidered on their left breast, and worn with the collar, with a green ribband over the left shoulder, and brought under the right arm; pendent thereto is the image of St. Andrew, with his cross, in a purple robe, with an oval of gold enamelled vert, with the former motto; but sometimes they wear, enriched in the same manner, a thistle crowned.

About the time of the Reformation, this order was dropped, till James II. of England resumed it, by creating eight knights: however, the revolution unsettled it again, and it lay neglected till queen Anne, in 1703, restored it to the primitive design, of twelve knights of St. Andrew. King George I. in the first of his reign, confirmed the statutes signed by queen Anne, with the addition of several more, among which was that of adding rays of glory to surround the figure of St. Andrew, which hangs at the collar: and though from the Reformation to George I. both elections and instalments had been dispensed with, his majesty ordered that chapters of election should, for the future, be held in the royal presence; to which end he ordered the great wardrobe to provide the knights brethren, and officers, with such mantles as the statutes of the said order appointed.

THI′STLY. *ad.* (from *thistle.*) Overgrown with thistles (*Thomson*).

THI′THER. *ad.* (ðiðeꞃ, Saxon.) 1. To that place: opposed to *hither* (*Denham*). 2. To that end; to that point.

THI′THERTO. *ad.* (*thither* and *to.*) To that end; so far.

THI′THERWARD. *ad.* (*thither* and *ward.*) Toward that place (*Milton*).

THIVE. See THEBES.

THLASPI. Shepherd's-purse. Penny-cress. In botany, a genus of the class tetradynamia, order siliculosa. Silicle emarginate, inversely heart-shaped, many-seeded; the valves boat-shaped, carinate and margined. Fourteen species; one a native of Arabia, the rest of Europe; six indigenous to our own fields, mountains, and pastures. Two species of thlaspi are directed in some pharmacopœias for medicinal uses; the thlaspi arvense, or treacle mustard, and the thlaspi campestre, or mithridate mustard. The seeds of both have an acrid biting taste approaching to that of common mustard, with which they agree nearly in their pharmaceutic qualities. They have also an unpleasant flavour, somewhat of the garlic or onion kind.

THO. *ad.* (ðonne, Saxon.) 1. Then (*Spenser*). 2. *Tho'* contracted for *though.*

THOA, in botany, a genus of the class monœcia, order hexandria. Calyxless; corolless. Male: stamens numerous, at the joints of the spikes. Female: germs two, at the base of the male spike, one at each side, sessile; stigma three or four-cleft; seed one, in a brittle shell, covered with a bristly web. One species only; a shrub of Guiana, with twisted climbing branches; oval mucronate leaves; spikes axillary and terminal.

THOAS. Ancient writers have recorded many of this name, the most celebrated of whom are the following.—A king of Taurica Chersonesus, in the age of Orestes and Pylades, whom he would have immolated on Diana's altars, according to the barbarous customs of the country, had they not been delivered by Iphigenia. (See IPHIGENIA.) According to some, Thoas was the son of Borysthenes.—A king of Lemnos, son of Bacchus and Ariadne, the daughter of Minos. He had been made king of Lemnos by Rhadamanthus. He was still alive when the Lemnian women conspired to kill all the males in the island, but his life was spared by his only daughter Hypsipyle, in whose favour he had resigned the crown. Hypsipyle obliged her father to depart secretly from Lemnos, and he arrived safe in a neighbouring island called Chios.

To THOLE. *v. n.* To wait a while (*Ainsworth*).

THOISSEL, a town of France, in the department of Ain, with a handsome college. It is seated in a fertile country, near the Saone and Chalcrone, 10 miles N. of Trevoux, and 200 S.E. of Paris. Lon. 4. 50 E. Lat. 46. 13 N.

THOLOUSE. See TOULOUSE.

THOMA (St.), an island of Africa, lying under the equator in 8° E. lon. It was discovered in 1429, and is almost round, about 30 miles in diameter. The soil is fertile, and produces plenty of sugar-canes. On the same vine are blossoms, and green and ripe grapes, all the year round. It is a very unwholesome country, possessed by the Portuguese, and few live to a great age. It consists chiefly of hills, intermixed with valleys, which are constantly filled with a thick stinking fog; but it agrees very well with the cattle, which are larger and finer here than on the Gold Coast of Guinea.

THOMAS, surnamed Didymus, an apostle

of Jesus Christ, was a native of Galilee. He is distinguished in the sacred history by his disbelief of the resurrection of his master, on which Jesus vouchsafed to permit him to put his fingers into the wounds which he had received. Then Thomas replied, "My Lord and my GOD." He preached the gospel in the eastern countries, and is said to have suffered martyrdom in India. St. Thomas's day is a festival of the Christian established churches, observed December 21st.

THOMAS (Jacques Ernest), a landscape painter, was born at Hagelstein in 1588. He studied at Landau, and then went to Italy, where he cultivated the friendship and the manner of Elsheimér. He died in 1653.

THOMAS (William), bishop of Worcester, was born at Bristol in 1613, and educated at St. John's College, Oxford; from whence he removed to Jesus College, where he took his degree of B. A. 1632, and soon after was chosen fellow. He underwent great hardships for his loyalty, till the restoration, when he took his doctor's degree, and in 1667 was promoted to the see of St. David's, from which he was translated to Worcester, in 1683. In 1687 he had the honour to entertain James II. at his palace in Worcester. He died in 1689. He published some sermons.

THOMAS (William), grandson of the foregoing, a learned divine and antiquary, was born in 1670. He published an edition of Dugdale's Warwickshire, and a Survey of the Cathedral of Worcester. He died in 1738.

THOMAS (St.), one of the Virgin Islands, in the W. Indies, with a harbour, a town, and a fort. After the capture of St. Eustatia, in 1781, it became the mart of that part of the West Indies. It is 15 miles in circumference, and belongs to the Danes. Lon. 64. 51 W. Lat. 18. 21 N.

THOMAS (St.), a town of Hindustan, on the coast of Coromandel, with an archbishop's see. It is subject to the Portuguese, and is three miles S. of Madras. Lon. 80. 25 E. Lat. 13. 2 N.

THOMAS (St.), a town of Guiana, seated on the Oronoko, and subject to Spain. In 1618, it was taken and burnt by sir Walter Raleigh. Lon. 63. 30 W. Lat. 7. 6 N.

THOMSON (James), a celebrated poet, son of a Scotch minister, and born at Ednam in Roxburghshire, 11th September 1700. He was educated at Jedburgh school, and Edinburgh university. While at the latter place he distinguished himself by the elegance and spirit of his compositions, and when he had been directed by the divinity professor to write an exercise on a psalm, descriptive of the greatness and majesty of God, his paraphrase was much admired for its poetical beauties. He then studied divinity, but soon relinquished it, and sought in London the patronage which might be extended to merit, and the publication of his Winter, 1726, soon introduced him to the great and learned. By the friendship of Dr. Rundle, he was recommended to lord chancellor Talbot, who patronized him. His Summer appeared in 1727, his Spring, in 1728; his tragedy of Sophonisba was written soon after, and acted with applause in 1729; and his Autumn was published in 1730. His poetical pursuits were now to be interrupted by his attendance on the honourable Mr. Charles Talbot, the son of the lord chancellor, in his travels; with him he visited most of the courts of Europe, and what judicious observations he made on this occasion appears from his excellent poem on Liberty, which he began soon after his return to England. But while he was writing the first part of this poem, he received a severe shock by the death of his noble friend and fellow-traveller, which was soon followed by another severer still, the death of lord Talbot himself, whom Mr. Thomson laments in the most pathetic manner, in the poem dedicated to his memory. His lordship had a little before made him secretary of the briefs; but this place falling with his patron, he found himself reduced to a state of precarious dependence, in which he passed the greatest part of the remainder of his life. It will not here be improper to mention an incident, worthy of notice. Mr. Thomson having the misfortune to be arrested by one of his creditors, the report of his distress reached the ears of Quin, the comedian, who being told that he was in the hands of a bailiff, at a spunging-house, in Holborn, went thither, and being admitted into the room, was, after some civilities on both sides, invited by Mr. Thomson to sit down. Quin then told him, that he was come to sup with him, and had already ordered supper to be provided, which he hoped he would excuse. Mr. Thomson made the proper reply, and the discourse turned on subjects of literature. When supper was over, and the glass had gone briskly round, Quin observed that it was time to enter upon business. On which Mr. Thomson, imagining he was come about some affairs relating to the drama, declared that he was ready to serve him to the utmost of his capacity in any thing he should command. "Sir," said Quin, "you mistake my meaning; I am in your debt, I owe you a hundred pounds; and I am come to pay you." Thomson replied, that as he was a gentleman whom he had never offended, he wondered he should come to insult him under his misfortunes. Quin, in return, expressed his detestation of such ungenerous behaviour, adding, "I say, I owe you a hundred pounds; and there it is," laying a bank note of that value before him. Thomson, filled with astonishment, begged he would explain himself. "Why," replied Quin, "I'll tell you. Soon after I had read your Seasons, I took it in my head, that, as I had something to leave behind me when I died, I would make my will; and among the rest of my legatees, I set down the author of the Seasons a hundred pounds; but this day hearing that you were in this house, I thought I might as well have the pleasure of being my own executor." Mr. Thomson expressed his grateful acknowledgments. The sum being much more than the debt for which he was confined, he was immediately discharged, and a very strict friendship subsisted from that time between him and his generous benefactor.

The profits Mr. Thomson received from his works were not inconsiderable: his tragedy of Agamemnon, acted in 1738, yielded a good sum. But his chief dependance was now on the protection and bounty of Frederic, prince of Wales, who, upon the recommendation of lord Lyttleton, settled on him a handsome allowance; but the misunderstanding which subsisted between his royal highness and the court prevented his obtaining a licence for his admirable tragedy of Edward and Eleanora. His next dramatic performance was the mask of Alfred, written jointly with Mr. Mallet. In 1745, his Tancred and Sigismunda was performed with applause; and in the mean time, he had been finishing his Castle of Indolence, an allegorical poem, in two cantos, which was the last piece Mr. Thomson published. Soon after, the generous friendship of lord Lyttleton procured for him the place of surveyor-general of the Leeward islands, which he enjoyed the two last years of his life. Mr. Thomson had improved his taste upon the finest originals, ancient and modern. The autumn was his favourite season for poetical composition, and the deep silence of the night he commonly chose for his studies.

As for the distinguishing qualities of his mind and heart, they best appear in his writings. There his devotion to the Supreme Being, his love of mankind, his country, and friends, shine out in every page; his tenderness of heart was so unbounded, that it took in even the brute creation. It is not known, that through his whole life he ever gave any person a moment's pain, either by his writings or otherwise. These amiable virtues did not fail of their due reward; the applause of the public attended all his productions: his friends loved him with an enthusiastic ardour, and sincerely lamented his untimely death, which happened the 27th of August, 1748, and his remains were deposited in Richmond church. His executors were lord Lyttleton and Mr. Mitchel, by whose interest Coriolanus, which he had just finished, was brought upon the stage to the best advantage. In 1762, were published two editions of his works, one in two volumes quarto, and the other in four volumes duodecimo. With the profits arising from the former, which was printed by subscription, is erected a monument to his memory, in Westminster abbey. Under it are these lines:

Tutor'd by thee, sweet Poetry exalts
Her voice thro' ages, and informs the page
With music, image, sentiment, and thought
Never to die.
Obiit Ætatis 48, A. D. 1748.
This monument was erected in
MDCCLXII.

For an exquisite epitaph written by Thomson himself, the reader may turn to the article Aikman.

Whether the object of poetry be to please, or to mend the heart, either definition will suit the muse of Thomson. His inspiration awakens, and almost creates anew, that moral sense which polished life, and the petty agitations of artificial society, are most apt to obliterate, viz. the sense of beauty in external nature; a principle on which so much innocence and happiness depend. Other poets have shown us choice scenes of nature; Thomson leads us abroad to look at her whole horizon, and all her vicissitudes. He gives us (as we might almost say) a separate and new enthusiasm for the beauties of creation, which, in other poets, we only feel by occasions, as the scenery is connected with some transient action or event. When we consider the nature of this moral charm in the author of the Seasons, we find a reason for his popularity exceeding that of all other poets, even those who are not his inferiors in genius. The narrative and dramatic poets, who appeal to the more tumultuous and palpable passions, depend on curiosity for the delight we find in them. When the story is told, or the drama is wound up, it is difficult to bring our curiosity fresh to their perusal. But the Seasons present to us imitations of nature, which the eye delights not merely to revisit, but to rest and to muse upon. In the placid and still nature of the objects, we have time to gather a multitude of associations. There is scarcely a reader of Thomson, whose own mind will not furnish recollections in proof of this. The features of nature, in Thomson's description, are without vagueness or indistinctness; but still general, and applicable, by association, to the particular scenery which is freshest and pleasantest in the actual remembrance of every individual among the million who read him. All descriptive poetry, it is true, possesses to a certain degree this charm of general applicability to individual association; but it might be easily shown, that an event and an agent, by being more particular themselves, lose, in generality of association, what they gain to the reader in curiosity and interest. This will not prove, it must be acknowledged, that Thomson's poetry yields more intense delight, in the present perusal, than Scott's, Campbell's, Montgomery's, and others of high merit; but by the calmness and permanence of the pleasure, it accounts for our recurring to it so often.

THONG. s. (ðƿanᵹ, ðƿonᵹ, Saxon.) A strap or string of leather (*Dryden*).

THOR, the eldest and bravest of the sons of Odin and Frea, was, after his parents, the greatest god of the Saxons and Danes while they continued heathens. They believed, that Thor reigned over all the aerial regions, which composed his immense palace, consisting of 540 halls; that he launched the thunder, pointed the lightning, and directed the meteors, winds, and storms. To him they addressed their prayers for favourable winds, refreshing rains, and fruitful seasons; and to him the fifth day of the week, which still bears his name, was consecrated.

THORACIC DUCT. Ductus thoracicus. Ductus pecquettii. In anatomy, the trunk of the absorbents; of a serpentine form, and about the diameter of a crow-quill. It lies upon the dorsal vertebræ, between the aorta and vena azygos, and extends from the posterior opening of the diaphragm to the angle formed by the union of the subclavian and jugular veins, into which it opens and evacuates its contents. In this course the thoracic duct receives the absorbent vessels from every part of the body.

THORACICA, in zoology, the third order of the class pisces or fishes, thus ordinally characterized: gills bony; ventral fins placed directly under the thorax or pectoral fins. It includes twenty-one genera; for which see Ichthyology and Zoology.

THO'RAL. *a.* (from *thorus*, Latin.) Relating to the bed (*Ayliffe*).

THORAX. (ϑωραξ, from ϑωρεω, to leap, because in it the heart leaps.) The chest. That part of the body situated between the neck and the abdomen. The external parts of the thorax are, the common integuments, the breasts, various muscles, and the bones of the thorax. (See Bones and Respiration.) The parts within the cavity of the thorax are, the pleura and its productions, the lungs, heart, thymus gland, œsophagus, thoracic duct, arch of the aorta, part of the vena cava, vena azygos, the eighth pair of nerves, and part of the great intercostal nerve.

THORN, in botany. See Cratægus.

Thorn (Ægyptian). The mimosa nilotica of Linnéus, from which we obtain gum arabic. See Arabic gum and Acacia.

Thorn or Spine, in botany. Spina. A sharp process from the woody part of a plant, for its defence; as in prunus, cratægus, &c. See Prickle. It commonly disappears by culture; as in pear, orange, &c.

A thorn may be either—terminating; placed at the end of a branch or leaf: or axillary; proceeding from the angle formed by a branch or leaf with the stem.

Foliary, or growing on the leaf.

Calycine, or growing on the calyx.

Simple or single—divided or branched.

Aloe has thorns at the edges of the leaves: thistle has them on the calyx.

Many fruits are protected by them: as, trapa, tribulus, spinacia, datura, &c.

Thorn, is used by an obvious application, for any thing troublesome.

Thorn, a city of Western Prussia, formerly a hanseatic town. A great tumult happened here in 1724, between the Roman catholics and protestants, on account of the students of the jesuits; upon which the Poles sent judges to try the magistrates for not suppressing the riot, who condemned two of the principal magistrates to be beheaded, and seven of the citizens. The protestants have a handsome college here. The Prussians forcibly took possession of this town, in 1793, and annexed it to their dominions. It is seated on the Vistula, over which is a remarkable bridge, 67 miles S. of Dantzic, and 105 N.W. of Warsaw. Lon. 18. 42 E. Lat. 53. 6 N.

Thorn, or Thoren, a town of Westphalia, in the bishopric of Liege, with a noble abbey, seven miles S.W. of Ruremonde.

Thorn, a town in the W. riding of Yorkshire, with a market on Wednesday; situate in a marshy soil, near the river Don, 10 miles N.E. of Doncaster, and 167 N. by W. of London. Lon. 1. 2 W. Lat. 53. 39 N.

Thorn (Apple), in botany. See Datura.

Thorn (Box), in botany. See Lycium.

Thorn (Christ's), in botany. See Rhamnus.

Thorn (Cockspur), in botany. See Cratægus.

Thorn (Evergreen), in botany. See Mespilus.

Thorn (Glastonbury), in botany. See Cratægus.

Thorn (Goat's), in botany. See Tragacanthus.

Thorn (Haw), in botany. See Cratægus.

Thorn (Lily), in botany. See Catesbæa.

Thorn (Purging), in botany. See Rhamnus.

Thorn (White), in botany. See Cratægus.

THORNAX, a mountain of Argolis. It received its name from Thornax, a nymph, who became mother of Buphagus, by Japetus. The mountain was afterwards called Coccygia, because Jupiter changed himself there into a cuckoo. (*Paus.*)

THORNBACK, in ichthyology. See Raia.

THORNBURY, a corporate town in Gloucestershire, with a market on Saturday. It is governed by a mayor, and seated near the Severn, 24 miles S.W. of Gloucester, and 121 W. of London. Lon. 2. 31 W. Lat. 51. 35 N.

THORNEY, a neat little market town in the fens of the Isle of Ely, about seven miles from Peterborough. Here was a famous abbey, the nave and elegant front of which are yet remaining. Thorney lies on the new turnpike road from Peterborough to Wisbeach; and being in the centre of a large tract of richly cultivated land, in the Bedford Level of the fens, is, though small, a lively place for trade and business.

Thorney, a small island in a bay of the English Channel, near the coast of Sussex, with a village of the same name, at the mouth of the Lavant, seven miles S.W. of Chichester.

THORNHILL (Sir James), an eminent English painter, was born in Dorsetshire in 1676, of an ancient family; but was constrained to apply to some profession by the distresses of his father, who had been reduced to the necessity of selling his family-estate. His inclination directed him to the art of painting;

and on his arrival at London he applied to his uncle, the famous Dr. Sydenham, who enabled him to proceed in the study of the art under the direction of a painter who was not very eminent. However, the genius of Thornhill made ample amends for the insufficiency of his instructor, and by an happy application of his talents he made so great a progress, that he gradually rose to the highest reputation.

His genius was well adapted to historical and allegorical compositions; he possessed a fertile and fine invention; and he sketched his thoughts with great ease, freedom, and spirit. He excelled also equally in portrait, perspective, and architecture; shewed an excellent taste for design, and had a free and firm pencil. Had he been so fortunate as to have studied at Rome and Venice, to acquire greater correctness at the one, and a more exact knowledge of the perfection of colouring at the other, no artist among the moderns might perhaps have been his superior. Nevertheless, he was so eminent in many parts of his profession, that he must for ever be ranked among the best painters of his time; and his performances in the dome of St. Paul's church at London, in the hospital at Greenwich, and at Hampton-court, are such public proofs of his merit as will convey his name to posterity with great honour.

This painter lived in general esteem: he enriched himself by the excellence of his works; was appointed state-painter to queen Anne, from whom he received the honour of knighthood; had the singular satisfaction to repurchase his family estate; and was so much distinguished as to be elected one of the members of parliament. He died in 1732.

THO'ROUGH. *preposition.* (the word *through* extended into two syllables.) 1. By way of making passage or penetration. 2. By means of (*Shakspeare*).

THO'ROUGH. *a.* (The adjective is always written *thorough*, the preposition commonly *through.*) 1. Complete; full; perfect (*Clarendon*). 2. Passing through (*Bacon*).

THOROUGH-BASS. Thorough-bass was invented about the year 1605, by Ludovico Viadana, some time maestro di capella of the cathedral church at Fano, a small city, situated in the gulf of Venice, in the duchy of Urbino, and afterwards of the cathedral of Mantua. See BASS (Thorough), and MUSIC.

THO'ROUGHFARE. *s.* (*thorough* and *fare.*) A passage through; a passage without any stop or let (*Shakspeare*).

THO'ROUGHLY. *ad.* (from *thorough.*) Completely; fully (*Dryden*).

THOROUGHPA'CED. *a.* (*thorough* and *pace.*) Perfect in what is undertaken; complete; thoroughsped (*Swift*).

THO'ROUGHSPED. *a.* (*thorough* and *sped.*) Finished in principles; thoroughpaced (*Swift*).

THOROUGHSTI'TCH. *ad.* (*thorough* and *stitch.*) Completely; fully (*L'Estrange*).

THOROUGH-WAX, in botany. See BUPLEURUM.

THORNY, in botany. Spinosus. Set with thorns: as the stem of many shrubs.—A thorny leaf. Folium spinosum. Running out at the edge into hard, stiff, sharp points. Opposed to inerme, unarmed.—Sometimes a petiole, stipule, or bracte, becomes hard and sharp: it is then said to be spinescens, spinescent, or to become thorny.—This, though a very different idea, has been sometimes confounded with spinosus.

THORNY TREFOIL. See FAGONIA.

THORNY WOODCOCK, in helminthology. See MUREX.

THORNTON (Bonnel), an English poet and miscellaneous writer, was born in London, in 1724, and educated at Westminster-school, from whence he was elected to Christ-church, Oxford, where he engaged with Colman, and others, in a periodical work entitled the Student; and afterwards in another of more merit, called the Connoisseur. In 1766 he published a translation of Plautus, in 2 vols. and the year following a burlesque poem, called the Battle of the Wigs, against the physicians. He died in 1768.

THORP. *s.* *Thorp, throp, threp, trep, trop,* are all from the Saxon ðoꞃp, which signifies a village (*Gibson*).

THOSE. *pronoun.* 1. The plural of *that.* 2. *Those* refers to the former, *these* to the latter noun (*Cowley*).

THOTH, or THEUT (called by the Phœnicians Taaut, by the Greeks Hermes, and by the Romans Mercury), was a Phœnician of very superior talents, and one of the civilizers of mankind. He was prime minister to Osiris, whom, after his death, he deified; and he was himself deified by his countrymen the Egyptians, for the benefits that he had rendered to the human race. See MERCURY, MYTHOLOGY, and POLYTHEISM.

THOU. *pronoun.* (ðu, Saxon; in the oblique cases singular *thee*, ðe, Saxon; in the plural *ye*, ȝe, Saxon; in the oblique cases plural *you*, eoƿ, Saxon.) *You* is now commonly used for the nominative plural. 1. The second pronoun personal (*Shakspeare*). 2. It is used only in very familiar or very solemn language (*Cowley. Addison*).

To THOU. *v. a.* (from the noun.) To treat with familiarity (*Shakspeare*).

THOUGH. *conj.* (ðeah, Sax. *thauh*, Goth.) 1. Notwithstanding that; although (*Watts*). 2. *As* THOUGH. As if; like as if (*Genesis*). 3. It is used at the end of a sentence in familiar language: however; yet (*Dryden*).

THOUGHT. The pret. and part. pass. of *think.*

THOUGHT. *s.* (from the pret. of *to think.*) 1. The operation of the mind; the act of thinking (*Prior*). 2. Idea; image formed in the mind (*Milton*). 3. Sentiment; fancy; imagery (*Dryden*). 4. Reflection; particular consideration (*Shakspeare*). 5. Conception; preconceived notion (*Milton*). 6. Opinion; judgment (*Pope*). 7. Meditation; serious consideration (*Roscommon*). 8. Design; purpose (*Jeremiah*). 9. Silent contemplation (*Shak.*).

10. Solicitude; care; concern (*Milton*). 11. Expectation (*Shakspeare*). 12. A small degree; a small quantity (*Swift*).

THO'UGHTFUL. *a.* (*thought* and *full.*) 1. Contemplative; full of reflection; full of meditation (*Dryden*). 2. Attentive; careful (*Philips*). 3. Promoting meditation; favourable to musing (*Pope*). 4. Anxious; solicitous (*Prior*).

THO'UGHTFULLY. *ad.* With thought or consideration; with solicitude.

THO'UGHTFULNESS. *s.* (from *thoughtful.*) 1. Deep meditation (*Blackmore*). 2. Anxiety; solicitude.

THO'UGHTLESS. *a.* (from *thought.*) 1. Airy; gay; dissipated. 2. Negligent; careless (*Rogers*). 3. Stupid; dull (*Dryden*).

THO'UGHTLESSLY. *ad.* Without thought; carelessly; stupidly (*Garth*).

THO'UGHTLESSNESS. *s.* (from *thoughtless.*) Want of thought; absence of thought.

THO'UGHTSICK. *a.* (*thought* and *sick.*) Uneasy with reflection (*Shakspeare*).

THOUINIA, in botany, a genus of the class pentandria, order monogynia. Calyx five-leaved; corol one-petalled, campanulate, inferior, bristly on the outside; drupe uncertain. One species only, a shrub of Madagascar, with scattered leaves; axillary, one-flowered peduncles.

THO'USAND. *a.* or *s.* (ðuꞅenꝺ, Saxon.) 1. The number of ten hundred. 2. Proverbially, a great number (*Spenser*).

THO'USANDTH. *a.* (from *thousand.*) The hundredth ten times told; the ordinal of a thousand: proverbially, very numerous.

THOW'L. *s.* A piece of timber by which oars are kept in their places when rowing (*Ainsworth*).

THRACE, Thraciæ, a large country of Europe, at the south of Scythia, now Romania. It had the Ægean sea on the south, on the west Macedonia and the river Strymon, and on the east the Euxine sea, the Propontis, and the Hellespont. Its western boundaries extended as far as the Ister, according to Pliny and others. The Thracians were cruel and barbarous, and much addicted to drinking, &c. It received its name from Thrax, the son of Mars, the chief deity of the country.

THRA'LDOM. *s.* (from *thrall.*) Slavery; servitude (*Sandys*).

THRALL. *s.* (ðꞃæl, Sax.) 1. A slave; one who is in the power of another (*Milton*). 2. Bondage; state of slavery or confinement (*Hudibras*).

To Thrall. *v. a.* To enslave; to bring into the power of another: out of use (*Donne*).

THRA'PPLE. *s.* The windpipe of any animal; the throttle.

To THRASH. *v. n.* (ðaꞃꞅcan, Saxon.) 1. To beat corn to free it from the chaff (*Shaks.*). 2. To beat; to drub (*Shakspeare*).

To Thrash. *v. n.* To labour; to drudge (*Dryden*).

THRA'SHER. *s.* (from *thrash.*) One who thrashes corn (*Locke*).

THRASHING, in agriculture, the operation by which corn is separated from the straw. This operation is performed in a variety of ways, sometimes by the feet of animals, sometimes by a flail, and sometimes by a machine.

The most ancient method of separating the corn from the straw was by the hoofs of cattle or horses. This was practised by the Israelites, as we find from the books of Moses; it was also common among the Greeks and Romans. Flails and thrashing machines were also not uncommon among these nations. The flail which was used by the Romans, called *baculis*, *fustis*, or *pertica*, was probably nothing more than a cudgel or pole. The thrashing machine, which was called *tribula* or *tribulum*, and sometimes *traha*, was a kind of sledge made of boards joined together, and loaded with stone or iron. Horses were yoked to this machine, and a man was seated upon it to drive them over the sheaves of corn.

Different methods are employed in different countries for separating the corn from the stalk. In the greatest part of France the flail is used; but in the southern districts it is generally performed by the feet of animals: animals are also used for the same purpose in Spain, in Italy, in the Morea, in the Canaries, in China, and in the vicinity of Canton, where the flail is also sometimes used. It appears that in hot climates the grains do not adhere so firmly to the stalk as in cold countries, and therefore may be more easily separated. This will explain the reason why animals are so frequently employed in hot countries for treading out the corn; whereas in cold climates we know they are seldom tried, and have no reason to suppose that they would answer the purpose. In the Isle of France in Africa, rice and wheat are thrashed with poles, and maize with sticks; for it has not been possible to teach the negroes the use of the flail.

The animals used for treading out corn are, oxen, cows, horses, mules, and even asses when the quantity is not great. The operation is performed in this manner: the sheaves, after being opened, are spread in such a manner that the ears of the corn are laid as much uppermost as possible, and a man, standing in the centre, holds the halters of the cattle, which are made to trot round as in a manege; whilst other men with forks shake the straw up from time to time, and the cattle are trotted over it again and again till they have beaten out all the grain. This method is expeditious enough; but besides bruising a considerable quantity of corn, it requires a great many cattle, and injures the legs of the horses and mules, which are preferred before cows and oxen for this work.

The flail is undoubtedly a much better instrument for thrashing corn than the feet of animals, for it separates the grain from the straw and husks both more effectually and more expeditiously; yet it is liable to many objections. It is a very laborious employment, too severe indeed even for a strong man; and as it is usually the interest of the thrasher rather to thrash much than to thrash clean, a good deal of corn will generally be left upon the straw. It is therefore an object of great importance in husbandry to procure a proper machine for separating the corn from the straw.

The first thrashing machine attempted in modern times, of which we have received any account, was invented in Edinburgh by Mr. Michael Menzies about the year 1732. It consisted of a number of instruments like flails, fixed in a moveable beam, and inclined to it at an angle of ten degrees. On each side of the beam in which the flails were fixed, floors or benches were placed for spreading the sheaves on. The flails were moved backwards and forwards upon the benches by means of a crank fixed on the end of an axle, which made about thirty revolutions in a minute.

In 1776 an attempt was made by Mr. Andrew Meikle, an ingenious millwright in the parish of Tyningham, East Lothian, to construct a new machine upon the principles which had been adopted by Mr. Menzies already mentioned. This consisted in making joints in the flails, which Mr. Menzies had formed without any. But this machine, after much labour and expence, was soon laid aside, on account of the difficulty of keeping it in repair, and the small quantity of work performed, which did not exceed one boll or six Winchester bushels of barley per hour. At length, however, Mr. Meikle invented one different in principle from the machines which had before been constructed. This was made in the year 1785; and in the following year the first thrashing machine on the same principles was erected in the neighbourhood of Alloa, in the county of Stirling. The machine answered completely, and the fame of it soon spread over the whole country. At length Mr. Meikle having got a patent for constructing them, these machines are now become very common. There are also various other ingenious constructions for this purpose, two or three of which we shall describe, after we have laid before the reader the useful rules to be observed in this class of inventions, given by Mr. Oliver Evans, of Philadelphia, in his Millwright's Guide.

Rule.—Step I. Is to investigate the fundamental principles of the theory, and the process of the art or manufacture we wish to improve.

II. To consider what is the best plan in theory that can be deduced from, or founded on, these principles, to produce the effect we desire.

III. Consider whether the theory is already put in practice to the best advantage, and what are the imperfections or disadvantages of the common process of the art, and whether they can be evaded and the process improved; and what plans are most likely to succeed.

IV. Make experiments in practice to try any plans that the speculative reasonings may propose or lead to. Any ingenious artist, taking the foregoing steps, will probably be led to improvement in his own art; for we see by daily experience that every art may be improved. It will, however, be in vain to attempt improvements, unless the mind be freed from prejudice in favour of established plans.

Example 1. Suppose we take the art of thrashing grain.

Then by the rule.

Step I. What are the principles on which this art is founded? The grain is contained in a head on the top of the straw enclosed in a husk, or chaff, that requires a force to break the hull, and disengage it; which may be done either on the principle of beating or of rubbing.

II. What is the best plan in theory for effecting this? As we find that it requires nearly equal force, and is all contained in the head, which is much less in quantity than the straw, theory directs the force to be regularly and uniformly applied to the head only, which will require but little power, seeing we can rub it out between our hands.

III. How is this theory put in practice; and what are the imperfections and disadvantages of the common process? the grain in the straw is laid on a plank floor, and beaten by men, with flails; or on the ground, and trod out by horses.

The disadvantages are.

I. The force is in both cases applied equally to the straw, as well as the head.

II. Much force is lost, being unnecessarily expended in beating the straw, yet many heads escape undone, because the force is so irregularly applied.

III. In treading by horses the grain as well as the straw gets dirty.

IV. Thrashing by men is both expensive and tedious. Now cannot improvements be made to overcome all these disadvantages? Such speculations have produced several.

First, a machine on the principles of a coffee mill, which requires very little force to rub the grain out of the heads, which are separated from the straw, by means of a machine on the principle of a comb, cutting them off. A machine to reap the heads without the straw is wanted to complete this theory, (in countries where the straw itself is not an article of demand).

Secondly, a machine invented and put in practice by colonel Alexander Anderson, of Philadelphia; the principles of which are to apply the strength of horses to strike the straw regularly with an uniform force, which finishes as it goes and clears the grain at the same time.

A cylinder, 4 feet long, and 3 feet 6 inches diameter, with eight bats fastened to its circumference parallel to its axis, and of its whole length, is made to revolve with rapidity; the bats strike the straw at every fourth of an inch, it being drawn into the machine by and between two collars that move slowly. This machine makes great dispatch, but is expensive, (and destroys the straw).

Others, attending to the principles of treading, have made a thing in the form of the frustum of a cane or sugar loaf, set full of cogs to act like the horses' feet. This is drawn by horses round a circular floor, adapted to it, on which the grain is laid, the centre of the circle being the vertex of the cone. This having considerable weight and many cogs, a horse will beat out much more with it than with his feet, because it will strike a great many more strokes with equal force: it has these advantanges; it can be made by an ordinary carpenter—is cheap—and the dirt is not mixed with the grain, straw, &c.

The first thrashing machine we shall here describe is one invented by Mr. H. P. Lee, of Maidenhead Thicket, and approved by the Society of Arts. Certificates accompanying the description in the Transactions of that Society, testify that in 1 hour and 55 minutes, 8 quarters and 3½ bushels of barley were thrashed by this machine, the straw being thrashed clean, and not broken; and that on Feb. 27th and 28th, 1810, thirty quarters of oats were thrashed out by the same machine.

Mr. Lee, in his attendance on the Committee of the Society of Arts, &c. appointed by the Society for the examination of the merits of his machine, stated, that his machine requires no rollers for entering the corn to be thrashed.

That it is about three feet diameter, and about two feet six inches in length.

That two horses are quite sufficient to work it; that from half past seven to two o'clock they will, without fatigue, thrash two loads of wheat, each of forty bushels.

That he thinks the straw is not so much broken as with other machines.

That the vanes within the cylinder turn from one hundred to one hundred and twenty times round for one round of the horses, in a space of twenty-two feet diameter.

That there are four vanes within the drum or cylinder, each vane one inch and a half thick, and enclosed to within about three inches of their exterior edges; that the drum or cylinder, within which the vanes turn, is close-fluted with wood of about an inch thick, and is in movable parts, so as to admit of being placed nearer to, or farther from, the vanes, as the corn to be thrashed may require.

That he has erected two of these machines on his estate, and has used them for three years.

A note sent to the Society by William Wright, of Henley upon Thames, Oxfordshire, the maker, states, that the price of a thrashing machine on this principle, including the horse-wheel, is forty-eight pounds, at his manufactory there.

Reference to the Engraving of Mr. Lee's Thrashing Machine, Pl. 171; *Fig.* 1 *and* 2.

Fig. 1 and 2 are a side and end view of the machine; A, in both figures, represents the framing of the machine; B is the shaft of a cog-wheel C, which is turned by cog-wheels, from the great horse-wheel, in the same manner as the ordinary thrashing mill; the cog-wheel C turns a small pinion D, to which it gives a rapid revolution; on the axis of the pinion, the beaters EE are fixed, and revolve with it, within a segment or drum, formed of iron plates, grooved or ribbed, parallel to the axis, as the figure represents, and connected together by wooden curbs FF, to which they are screwed. *aa* is the feeding board upon which the corn is placed to enter the machine. The end of this board is fixed very near to the four vanes, or beaters, *bbbb*; as these revolve rapidly they strike the heads of the corn upwards, with such a jerk as to beat out all the corn from those ears which they meet fairly; but if any escape they are drawn in, together with the straw, and rubbed round by the beaters against the inside of the ribbed drum, or cylinder, F, so as to open the ears and let out the corn, though the ears come in any position whatever. At H is a grating, upon which the beaters deliver the corn, chaff, and straw all together; the two former fall through upon the ground at X, and the latter slides down on the grate; the corn is afterward to be dressed in a winnowing machine, which separates the light and heavy corn from the chaff. The curbs F are fixed by screws, which can be adjusted so as to bring the cylinder nearer, or farther from the beaters, to adapt the machine for thrashing different kinds of grain; for it is evident, that large corn, as pease, beans, &c. must require more space to rub them in than the smaller grain, as wheat and barley. L, fig. 1, is one of the uprights of the frame which supports the bearing for the axis B of the cog-wheel; and M is an oblique brace, which strengthens the frame. N is the stage on which the man who feeds the machine stands.

The following description of a thrashing machine of small power, uniting the qualities of doing quick and clean work, is given by the inventor, Richard Tawney, Esq. of Dunchurch Lodge, in Tilloch's Philosophical Magazine.

"I was induced to the attempt by observing that in every machine in this neighbourhood, both fixed and portable, a very large portion of the power was lost by friction, seldom less than half, and wished to try what could be effected by a machine constructed with a view to reduce the friction as much as possible.

"The drawing, pl. 171, fig. 3, presents an elevation and section of a machine to be worked by two men, with each a winch upon the axis of a wheel (which, as they could not be well shewn in a geometrical view, are purposely omitted) turning by a small rope a pulley fixed upon the axis of the drum.

"It will be seen that the wheel is hung upon friction rollers, and it was my intention to have put rollers to the drum axis as well, but as these were found to enhance the price, and thereby defeat the general utility of the plan, the latter were omitted, and the friction kept down by making the brasses and axis as perfect and as small as they well could be with safety.

"It should be mentioned that the drum,

Mr. Lee's Thrashing Machine.

Fig. 1.

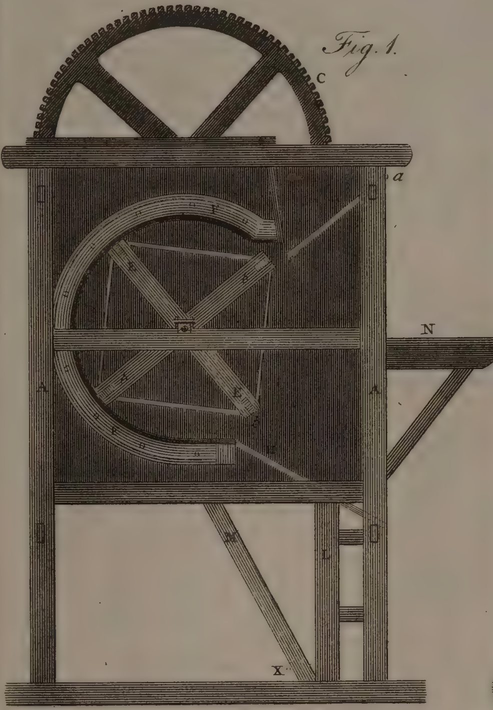
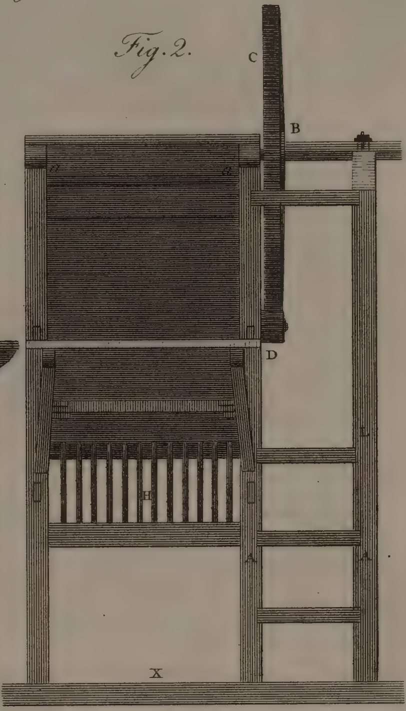
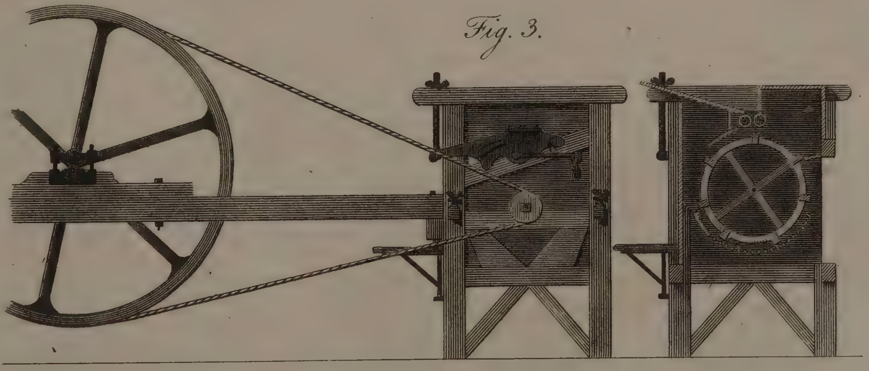


Fig. 2.



Mr. Tawney's Thrashing Machine.

Fig. 3.



H. Mutlow, Sculp

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rollers, and plates, are upon the principle of the machines made by a Mr. Wilson, of Leicester, which for quantity and goodness of work are the best of a great number that I have seen. In these machines, as will be observed in the section, the feed rollers are placed horizontally, and they are fed by laying the corn upon a board inclining to them from the top. One roller is turned by a small strap from the drum axis; and as the two are made to touch by a thin well turned iron wheel or flanch at each end, the other roller is moved by friction.—Lest this should be thought strange in a machine purposely made to avoid friction, it must be remembered that, as the wheels are small, the points of contact are trifling, and that there are no other means of obtaining an equable motion so good.

"The axis of the second roller is hung at each end upon a pivot, so that when the feed is too great the roller will open, and be brought back again by a weight suspended at the end of a small lever.

"The drum is made open, and the beaters fixed upon a ring at each end.

"My machine is greatly improved by giving the drum (as well as the large wheel) a fly motion. The rings are made thin and light of wood, and the beaters of bar iron. The more simple way perhaps would be to make the rings of cast iron, and throw the weight to the rim.

"The leading feature of Mr. Wilson's machine is the situation of the parallel ribbed plates against which the corn is beaten or rubbed. Compared with other machines, they may be said to be divided: one part is fixed upon the levers which carry the feed rollers, the distance of which is regulated by a screw through the top of the frame;—the other is fixed in the frame which carries the iron grating, and with that the distance is regulated by a screw at each corner.

"It will be seen that the straw after passing the first plate may take a different direction before it enters upon the second plate and grating, and to this circumstance I think is to be attributed the machine's superior work. By placing the feed rollers so far from the ribbed plate and beaters, the straw is not at all broken, but will admit of being tied up in boltings, as well as if thrashed by the flail.

"The great wheel of this machine is six feet six inches diameter—to avoid resistance from the air, it is but two inches in thickness, and the spokes are made elliptical. To give it a fly motion, fifty-six pounds of cast iron are added to the ends of the spokes, as described in the elevation. This weight is sufficient to lead the men on, so that the difficulty is not to keep them up to a certain number of revolutions per minute, but to dissuade them from doing too much.

"The pulley hitherto worked upon the drum has been either one-eighth or one-tenth the diameter of the wheel; and as in working the former is lighter, I find the velocity of the hand increased in proportion. The minimum velocity of the hand is forty revolutions per minute, and this carries the drum through a greater space than that of any ordinary machine of two or four horse power.

"The winches at first were made to describe a circle of thirty-six, but were subsequently shortened to one of thirty inches diameter.

"The rope is of the best tarred kind, one inch and a half in circumference, and spliced together.

"The carriages of the wheel are each fixed to the frame by two screw pins, and the variation of the rope is remedied by slackening of the nuts.

"What this machine will thrash when corn yields well, I am not prepared to say.

"It has been tried with the worst of every sort of grain, and thrashed it perfectly clean.

"With the labour of two men, and that about the same as when using the flail, it thrashed of the last season from thirty to thirty-six bushels (eight and half gallon measure) of wheat per day, which will warrant an expectation of considerably more in a good yielding year.

"In the late wet spring I found it exceedingly useful to employ my men on those days when nothing out of doors could be done; and although with a winch it may be not quite applicable to the case of every large farmer, still I am persuaded a considerable part of the farming interest will find it of real advantage as an auxiliary, if not a principal machine, and to the small occupier I can recommend it as the most effective hand machine yet in use."

THRA'SHINGFLOOR. *s.* An area on which corn is beaten (*Dryden*).

THRASO'NICAL. *a.* (from *Thraso*, a boaster in old comedy.) Boastful; bragging (*Shakspeare*).

THRASIBULUS. The most celebrated of this name is a general of Athens, who began the expulsion of the 30 tyrants of his country, though he was only assisted by 30 of his friends. His efforts were attended with success, B. C. 401, and the only reward he received for this patriotic action was a crown made with two twigs of an olive branch; a proof of his own disinterestedness and the virtue of his countrymen. The Athenians employed a man whose abilities and humanity were so conspicuous, and Thrasibulus was sent with a powerful fleet to recover their lost power in the Ægean, and on the coast of Asia. After he had gained many advantages, this great man was killed in his camp by the inhabitants of Aspendus, whom his soldiers had plundered without his knowledge, B. C. 391.

THRASYMACHUS, a native of Carthage, who became the pupil of Isocrates and of Plato. Though he was a public teacher at Athens, he starved for want of bread, and at last hanged himself.

THRASYMEDES, a son of Nestor, king

of Pylos, by Anaxibia, the daughter of Bias. He was one of the Grecian chiefs during the Trojan war.

THRASYMENUS, a lake of Italy near Perusium, celebrated for a battle fought there between Annibal and the Romans, under Flaminius, B. C. 217. No less than 15,000 Romans were left dead on the field of battle, and 10,000 taken prisoners, or according to Livy 6,000, or Polybius 15,000. The loss of Annibal was about 1500 men. About 10,000 Romans made their escape all covered with wounds. This lake is now called the lake of Perugia.

THRAVE. *s.* (ðꞃaꝼ, Saxon.) 1. A herd; a drove: out of use. 2. The number of two dozen.

THREAD. *s.* (ðꞃæꝺ, Sax. *draed*, Dutch.) 1. A small line; a small twist (*South*). 2. Any thing continued in a course; uniform tenour (*Burnet*).

To Thread. *v. a.* (from the noun.) 1. To pass through with a thread (*Sharp*). 2. To pass through; to pierce through (*Shakspeare*).

Thread, a small line made up of a number of fine fibres of any vegetable or animal substance, such as flax, cotton, or silk; from which it takes its name of linen, cotton, or silk thread.

Linen and cotton thread may be dyed of a durable and deep black by a solution of iron in sour beer, in which the linen is to be steeped for some time, and afterwards boiled in madder. See the article Dyeing. Thread may be easily bleached by the oxymuriatic acid discovered by Mr. Scheele. This acid whitens cloth remarkably well, but it is still more adtageous for bleaching thread.

Thread, in botany, Dr. Withering's term for the filament.

THRE'ADBARE. *a.* (*thread* and *bare*.) 1. Deprived of the nap; worn to the naked thread (*Shakspeare*). 2. Worn out; trite (*Child*).

THRE'ADEN. *a.* (from *thread*.) Made of thread (*Shakspeare*).

THREADSHAPED, in botany. See Filiform.

To THREAP. *v. a.* A country word denoting to argue much or contend (*Ainsworth*).

THREAT. *s.* (from the verb.) Menace; denunciation of ill (*Shakspeare*).

To Threat. *To* Thre'aten. *v. a.* (ðꞃeaꞇian, Saxon.) 1. To menace; to denounce evil (*Milton*). 2. To menace; to terrify, or attempt to terrify, by showing evil (*Pope*). 3. To menace by action (*Dryden*).

THRE'ATENER. *s.* (from *threaten*.) Menacer; one that threatens (*Milton*).

THRE'ATENING. *s.* (from *threaten*.) A menace; a denunciation of evil (*Law*).

THRE'ATENINGLY. *ad.* (from *threaten*.) With menace; in a threatening manner.

THRE'ATFUL. *a.* (*threat* and *full*.) Full of threats; minacious (*Spenser*).

THREE. *a.* (ðꞃie, Saxon.) 1. Two and one. 2. Proverbially, a small number (*Shak.*).

Three-capsuled pericarp, in botany. Tricapsulare pericarpium. Having three capsules succeeding to each flower: as in veratrum, delphinium.

Three-celled pericarp, in botany. Triloculare pericarpium. Divided into three cells within: as lilium.

Three-cleft, in botany. Trifidus. Divided into three parts by linear sinuses with straight margins. Applied to the leaf in reseda lutea; to the calyx in alisma, cliffortia; to the nectary in nigella; to the stigma in amaryllis formosissima; to the cirrus, &c.

Three-cleft-palmate leaf, in botany. Folium trifido-palmatum. A palmate leaf with only three divisions.

Three-cornered or Three-edged, in botany. Trigonus. A species of the anceps or ancipital stem, according to Linnéus; who says, Anceps angulos duos oppositos habet.—Caulis trigonus, therefore, should have three opposite angles, which is impossible. This term is explained by Berkenhout to be three-sided, with the sides either concave or convex; by Withering, as having three angles, and the sides not flat; by the Lichfield Society, as having three prominent longitudinal angles, hollowed longitudinally with three angles.

Three-flowered peduncle, in botany. Triflorus pedunculus. Bearing three flowers together.

Three-leaved calyx, in botany. Triphyllus. Consisting of three distinct leaflets, as in tradescantia.

Three-lobed leaf, in botany. Folium trilobum. Divided to the middle into three parts, standing wide from each other, and having convex margins; as in leonurus cardiaca, reseda odorata.

Three-nerved leaf, in botany. Folium trinervium. Having three distinct vessels or nerves running longitudinally without branching.

Three-parted leaf, in botany. Folium tripartitum. Divided into three parts down to the base, but not entirely separate; as in eryngium campestre. Applied also to the cyme.

Three-petalled or Tripetalous corol, in botany. Tripetala. Consisting of three distinct petals; as in alisma, sagittaria.

Three-seeded capsule, in botany. Trisperma. Containing three seeds: as in euphorbia. Applied also to the berry.

Three-sided stem, in botany. Triqueter caulis. Having three plane sides: as in viola tricolor: culm, in carex: leaf, in anthericum ossifragum. Applied also to the scape, petiole, peduncle, and pericarp.

Three-valved pericarp, in botany. Trivalve pericarpium. Opening with three valves: as in viola, polemonium, cistus helianthemum.

Three Rivers, or Trois Rivieres, a town of Lower Canada, situate on a river of the same name, which, before its junction with the St. Lawrence, is divided by two islands into three branches. It has a church, a convent, and an hospital. Nine miles up the river is a considerable iron foundery. It is 70 miles W.S.W. of Quebec.

THRE′EFOLD. *a.* (ðꞃeoꝼealꝺ, Saxon.) Thrice repeated; consisting of three (*Pope*).

THRE′EPENCE. *s.* (*three* and *pence.*) A small silver coin valued at thrice a penny (*Shakspeare*).

THRE′EPENNY. *a.* (*triobolaris*, Latin.) Vulgar; mean.

THRE′EPILE. *s.* (*three* and *pile.*) An old name for good velvet (*Shakspeare*).

THREEPI′LED. *a.* Set with a thick pile: in another place it seems to mean piled one on another (*Shakspeare*).

THREESCO′RE. *s.* (*three* and *score.*) Thrice twenty; sixty (*Dryden*).

THRENO′DY. *s.* (θρηνωδια.) A song of lamentation.

THRE′SHER. *s.* (properly *thrasher.*) (*Dodsley*).

THRE′SHOLD. *s.* (ðꞃeꞅcƿalꝺ, Saxon.) The ground or step under the door; entrance; gate; door (*Shakspeare*).

THREW. The preterit of *throw*.

THRICE. *ad.* (from *three.*) 1. Three times (*Spenser*). 2. A word of amplification (*Dryden*).

To THRID. *v. a.* (corrupted from *thread.*) To slide through a narrow passage (*Pope*).

THRIFT. *s.* (from *thrive.*) 1. Profit; gain; riches gotten; state of prospering (*Sidney*). 2. Parsimony; frugality; good husbandry (*Dryden*).

Thrift, in botany. See Statice.

THRI′FTILY. *ad.* (from *thrifty.*) Frugally; parsimoniously (*Swift*).

THRI′FTINESS. *s.* (from *thrifty.*) Frugality; husbandry (*Wotton*).

THRI′FTLESS. *a.* (from *thrift.*) Profuse; extravagant (*Spenser*).

THRI′FTY. *a.* (from *thrift.*) 1. Frugal; sparing; not profuse; not lavish (*Swift*). 2. Well husbanded (*Shakspeare*).

To THRILL. *v. a.* (ðẏꞃlian, Saxon.) To pierce; to bore; to penetrate; to drill (*Milt.*).

To Thrill. *v. n.* 1. To have the quality of piercing (*Spenser*). 2. To pierce or wound the ear with a sharp sound (*Spenser*). 3. To feel a sharp tingling sensation (*Shakspeare*). 4. To pass with a tingling sensation (*Addison*).

THRINAX, in botany, a genus of the class hexandria, order monogynia. Calyx six-toothed; corolless; stigma funnel-form, oblique; berry one-seeded. One species only, a West Indian palm, from ten to twenty feet high; fronds fan-shaped, palmate, plaited, with lanceolate rigid segments; the stalks unarmed, longer than the leaves. It is now cultivated in Kew-Gardens under the name of small Jamaica fan-palm.

THRINCIA, in botany, a genus of the class syngenesia, order polygamia æqualis. Receptacle cellular; down of the margin a many-cleft membrane, of the centre feathered and pedicelled; calyx eight-angled, eight-leaved. One species only, T. hirsuta, with a one-flowered scape; leaves lanceolate, rough, with simple hairs; found wild in our pastures.

THRIPS, in zoology, a genus of the class insecta, order hemiptera. Snout obsolete, concealed within the mouth, so minute as to be scarcely perceptible; antennas filiform, as long as the thorax; body of equal thickness through the whole length, and slender; the wings four, extended along the back, narrow in proportion to their length, and crossed at some distance from the base; abdomen bent upwards; feet commonly with two articulations. Eight species.

The animals of this family are so minute, that they are not objects of discussion, unless viewed with a microscope: to the naked eye they appear rather like atoms than living animals. They reside commonly upon flowers, and under the bark of trees; in which last also their larves are found, which only differ from them by their wanting wings and wing-cases. The thrips juniperina is one of the largest of this diminutive race; the thorax and abdomen are black, the elytra white. In autumn it is found in numbers among flowers, and on the galls of the juniper. Linnéus for a long time was uncertain how to arrange it, from not discovering more than one pair of wings. M. de Geer first observed that it had four exceedingly narrow ones, with which it flies but little, but runs quickly. This inhabits our own country.

T. physapus, with a black body, and upper wings glaucous, is found in our own country in composite flowers, and in the spikes of wheat and rye, to which it is very destructive. The larve is yellow, six-footed; antennas and head black and white; pupe whitish, with black eyes.

To THRIVE. *v. n.* pret. *throve*, *thrived*; part. *thriven*. (perhaps *throve* was the original word, from *throa*, Islandic, *to increase.*) To prosper; to grow rich; to advance in any thing desired (*Watts*).

THRI′VER. *s.* (from *thrive.*) One that prospers; one that grows rich (*Hayward*).

THRI′VINGLY. *ad.* (from *thriving.*) In a prosperous way.

THRO′. Contracted by poets from *through* (*Dryden*).

THROAT. *s.* (ðꞃoꞇe, ðꞃoꞇa, Saxon.) 1. The forepart of the neck; the passages of nutriment and breath (*Shakspeare*). 2. The main road of any place (*Thomson*). 3. *To cut the* Throat. To murder; to kill by violence (*L'Estrange*).

THRO′ATPIPE. *s.* (*throat* and *pipe.*) The weason; the windpipe.

THROATWORT, in botany. See Campanula.

Throatwort (Blue umbelliferous). See Trachelium.

To THROB. *v. n.* 1. To heave; to beat; to rise as the breast with sorrow or distress (*Smith*). 2. To beat; to palpitate (*Wiseman*).

Throb. *s.* (from the verb.) Heave; beat; stroke of palpitation (*Addison*).

THROE. *s.* (from ðꞃopian, *to suffer*, Sax.) 1. The pain of travail; the anguish of bringing children (*Milton*). 2. Any extreme agony; the final and mortal struggle (*Spenser*).

To THROE. *v. a.* (from the noun.) To put in agonies (*Shakspeare*).

THROMBUS. (θρομϐο; from θροεω, to disturb.) A small tumour which sometimes arises after bleeding, from the blood escaping from the vein into the cellular structure surrounding it.

THRONE. *s.* (*thronus*, Latin; θρονος.) 1. A royal seat; the seat of a king (*Dryden*). 2. The seat of a bishop (*Ayliffe*).

To THRONE. *v. a.* (from the noun.) To enthrone; to set on a royal seat (*Pope*).

THRONG. *s.* (ðꞃanᵹ, Saxon.) A crowd; a multitude pressing against each other (*Dryd.*).

To THRONG. *v. n.* (from the noun.) To crowd; to come in tumultuous multitudes (*Shakspeare*).

To THRONG. *v. a.* To oppress or incommode with crowds or tumults (*Milton*).

THRO'STLE. *s.* (ðꞃoꞅtle, Saxon.) The thrush; a small singing bird. See TURDUS.

THRO'TTLE. *s.* (from *throat*.) The windpipe; the larynx (*Brown*).

To THRO'TTLE. *v. a.* (from the noun.) To choke; to suffocate; to kill by stopping the breath (*Dryden. Swift*).

THROVE. The preterit of *thrive*.

THROUGH. *prep.* (ðuꞃh, Sax. *door*, Dut.) 1. From end to end of; along the whole mass or compass (*Dryden*). 2. Noting passage: *the bullet passed* through *the board* (*Newton*). 3. By transmission (*Temple*). 4. By means of: *he was advanced* through *his friends* (*Prior*).

THROUGH. *ad.* 1. From one end or side to the other (*Bacon*). 2. To the end of any thing (*South*).

THRO'UGHBRED. *a.* (*through* and *bred*, commonly *thoroughbred*.) Completely educated; completely taught (*Grew*).

THROUGHLI'GHTED. *a.* (*through* and *light*.) Lighted on both sides (*Wotton*).

THRO'UGHLY. *ad.* (from *through*. It is commonly written *thoroughly*, as coming from *thorough*.) 1. Completely; fully; entirely; wholly (*Spenser*). 2. Without reserve; sincerely (*Tillotson*).

THROUGHO'UT. *prep.* (*through* and *out*.) Quite through; in every part of (*Bac.*).

THROUGHOUT. *ad.* Every where; in every part (*Dryden*).

THROUGHPA'CED. *a.* (*through* and *pace*.) Perfect; complete (*More*).

THROW. *v. n.* pret. *threw*; part. pass. *thrown*. (ðꞃapan, Saxon.) 1. To fling; to cast; to send to a distant place by any projectile force (*Knolles*). 2. To toss; to put with any violence or tumult (*Berkley*). 3. To lay carelessly, or in haste (*Clarendon*). 4. To venture at dice (*Shakspeare*). 5. To cast; to strip; to put off (*Shakspeare*). 6. To emit in any careless or vehement manner (*Watts*). 7. To spread in haste (*Pope*). 8. To overturn in wrestling (*South*). 9. To drive; to send by force (*Dryden*). 10. To make to act at a distance (*Shakspeare*). 11. To repose (*Taylor*). 12. To change by any kind of violence (*Addison*). 13. To turn. (*tornare*, Latin.) As balls *thrown* in a lathe (*Ainsworth*). 14. *To* THROW *away*. To lose; to spend in vain (*Dryden*). 15. *To* THROW *away*. To reject (*Taylor*). 16. *To* THROW *by*. To reject; to lay aside as of no use (*Ben Jonson*). 17. *To* THROW *down*. To subvert; to overturn (*Addison*). 18. *To* THROW *off*. To expel (*Arbuthnot*). 19. *To* THROW *off*. To reject; to discard (*Sprat*). 20. *To* THROW *out*. To exert; to bring forth into act (*Ad.*). 21. *To* THROW *out*. To distance; to leave behind (*Addison*). 22. *To* THROW *out*. To eject; to expel (*Swift*). 23. *To* THROW *out*. To reject; to exclude (*Swift*). 24. *To* THROW *up*. To resign angrily (*Addison*). 25. *To* THROW *up*. To emit; to reject; to bring up (*Arbuthnot*).

To THROW. *v. a.* 1. To perform the act of casting. 2. To cast dice. 3. *To* THROW *about*. To cast about; to try expedients (*Sp.*).

THROW. *s.* (from the verb.) 1. A cast; the act of casting or throwing (*Addison*). 2. A cast of dice; the manner in which the dice fall when they are cast (*Bentley*). 3. The space to which any thing is thrown (*Addison*). 4. Stroke; blow (*Spenser*). 5. Effort; violent sally (*Addison*). 6. The agony of childbirth; in this sense it is written *throe* (*Dry.*).

THRO'WER. *s.* (from *throw*.) One that throws (*Shakspeare*).

THRUM. *s.* (*thraum*, Islandic.) 1. The ends of weavers threads. 2. Any coarse yarn (*Shakspeare*).

To THRUM. *v. a.* To grate; to play coarsely (*Dryden*).

THRUSH, in ornithology. See TURDUS.

THRUSH. A disease common to infancy. See APHTHA.

THRUSH, or RUNNING THRUSH, in veterinary medicine, a disease in the foot of a horse, from an inflammation of the sensible frog, occasioned either by contracted heels, the want of cleanliness in the part, or shoeing on erroneous principles; but most frequently the last. See SHOEING.

The thrush may be known by a tenderness felt on pressing the frog, which is also accompanied with a discharge of matter.

The cure consists in removing the shoe, and lowering the heels, so much as that the frog may come in contact with the ground. After which the horse should stand without shoes for several days: and the part should be washed two or three times a day with a brush and soap lather, and afterwards dressed with digestive ointment.

"All the diseased parts," says Mr. Denny, "should be removed with the drawing-knife. If the animal be not allowed rest, bar-shoes must be applied until the disease is removed. If there be much inflammation, we may take away three or four pints of blood, and give a mash, with nitre, every evening. A rowel may likewise be placed in the chest, and continued for two or three weeks. A diuretic ball may be occasionally given, and the foot fomented in warm water, in which a handful of salt is dissolved, previous to the use of the dressings."

If the disease proceed from contracted heels, the only certain remedy is the use of the artificial frog invented by Mr. Coleman. See Frog.

To THRUST. *v. a.* (*trusito*, Latin.) 1. To push any thing into matter, or between close bodies (*Revelation*). 2. To push; to move with violence (*Spenser*). 3. To stab (*Numbers*). 4. To compress (*Judges*). 5. To impel; to urge (*Shakspeare*). 6. To obtrude; to intrude (*Locke*).

To Thrust. *v. n.* 1. To make a hostile push; to attack with a pointed weapon. 2. To squeeze in; to put himself into any place by violence (*Dryden*). 3. To intrude (*Rowe*). 4. To push forward; to come violently; to throng; to press (*Knolles*).

Thrust. *s.* (from the verb.) 1. Hostile attack with any pointed weapon (*Dryden*). 2. Assault; attack (*More*).

Thrust, in statics, the shoot, drift, push, or pressure, of an arch against its pier or abutment.

THRU'STER. *s.* He that thrusts.

THRYALLIS, in botany, a genus of the class decandria, order monogynia. Calyx five-parted; petals five; capsule three-grained. One species, a Brasil shrub, with opposite ovate entire leaves; simple terminal raceme; yellow flowers.

THUANUS (Jacobus Augustus), or de Thou, an eminent French historian, was born at Paris in October, 1553. He was, to the end of his life, engaged more or less in the service of the state, and died in May, 1617, leaving behind him a general history of the world, from 1545 to 1608, written in very clear and elegant Latin. He also excelled in poetry, and published several productions of that kind.

An account of Thuanus's life and writings was published in 1807, by the Rev. J. Collinson, of Queen's college, Oxford.

THUCYDIDES, a celebrated Greek historian, born at Athens. His father's name was Olorus, and among his ancestors he reckoned the great Miltiades. During the Peloponnesian war he was commissioned by his countrymen to relieve Amphipolis; but the quick march of Brasidas, the Lacedæmonian general, defeated his operations, and Thucydides, unsuccessful in his expedition, was banished from Athens. This happened in the eighth year of the war, and in the place of his banishment he began to write an impartial history of the important events which had happened during his administration, and which still continued to agitate the several states of Greece. This famous history is continued only to the 21st year of the war, and the remaining part of the time till the demolition of the walls of Athens was described by Theopompus and Xenophon. Thucydides wrote in the Attic dialect, as possessed of more vigour, purity, elegance, and energy. His history has been divided into eight books, the last of which is imperfect, and supposed to have been written by his daughter. The character of this interesting history is well known. Thucydides stands unequalled for the fire of his descriptions, the conciseness, and, at the same time, the strong and energetic manner of his narratives. His impartiality is indubitable, as he no where betrays the least resentment against his countrymen, and the factious partizans of Cleon, who had banished him from Athens. The history of Thucydides was so admired, that Demosthenes, to perfect himself as an orator, transcribed it eight different times, and read it with such attention, that he could almost repeat it by heart. Thucydides died at Athens, where he had been recalled from his exile, in his 80th year, 391 years before Christ.

Balancing its defects and its excellencies, the history of Thucydides deserves, and will retain, the character bestowed on it by its author, as κτημα ες αει, an expression which its just application in this instance has rendered almost proverbial. It may likewise be recommended as a most useful study for the perfect attainment of the Greek language. Adolescentes ut non nisi Xenophontea aut Herodotea facilitate et perspicuitate præparati ad Thucydidem accedent, ita hujus lectione exercitati, ad nullum non sive scriptorem sive poetam insigni cum intelligentiæ spe et fructu progredientur. (*Wyttenbach*).

The first edition of Thucydides appeared at Venice, from the press of Aldus, 1502, fol. He was at the same time engaged in the publication of Herodotus and Sophocles. The Greek scholia were published by him the following year, annexed to a volume containing the Greek history of Xenophon, its continuation by Georgius Gemistus Pletho, and Herodian.

The next edition, comprising the Greek scholia, is due to B. Junta, Florent. 1506, fol. Other Juntine editions are mentioned by bibliographers.

Joachim Camerarius superintended an edition, with the scholia, printed at Basil, 1540, fol.

H. Stephens printed two editions of this author, Par. fol. 1564, 1588, of which the latter is most valued, as containing various improvements both of the text and version.

The edition of Æmilius Portus, printed at Frankfort, 1594, fol. is taken from the second edition of Stephens, with many typographical errors. It is chiefly distinguished by the annotations of Fr. Portus, the father of Æmilius.

After this edition a long pause of more than a century occurs in the publication of Thucydides. In 1696 appeared the splendid edition of Hudson at Oxford, rendered commodious by various conveniences of arrangement, and enriched with collations of several MSS.

The edition of Hudson is the basis of that of

Wasse and Duker, Amstel. fol. 1731, which is splendid and valuable, but Duker does not profess to have bestowed on it all the care requisite for a complete edition. The superintendance of the publication was committed to him by the booksellers, Wetstein and Smith; he arranged the materials which they had provided, and added whatever occurred to his own notice without much search.

The text of this edition was elegantly reprinted at Glasgow, 8 vols. duod. 1759.

Thucydides was published at Vienna, 2 vols. 8vo. 1785, by Alter. This edition contains the Greek text, with some collations of MSS., and possesses, therefore, some degree of critical importance.

Duker's edition was reprinted at Deuxpont, in 6 vols. 8vo. 1788. The typographical execution is elegant and correct.

The edition begun by Gottleber and Baver, and completed by Beck, 2 vols 4to. Lips. 1790, 1804, is on the whole the most useful edition of Thucydides, as containing a summary of what has been written by preceding commentators and critics, with some original observations, not devoid of merit. Its typography is, however, inelegant.

The Edinburgh edition, 6 vols. duod. 1803, is elegant and accurate, and some judicious alterations are introduced into the text. To the preface the initials P. E. are annexed, said to denote the Rev. Peter Elmsley.

THUJA. Arbor vitæ. Tree of life. In botany, a genus of the class monœcia, order monadelphia. Calyx a scale of the ament; corolless; stamens four. Fem.: Calyx a two-flowered scale of the cone; corolless; pistil one; nut one in each scale, winged. Four species, of which the two following are cultivated.

1. T. occidentalis. American arbor vitæ. Cones smooth, with obtuse scales; branches spreading; trunk strong and woody, rising to the height of upwards of forty feet; the branches produced irregularly on every side, almost horizontally, the young slender shoots frequently hanging down; flowers produced from the sides of the young branches, pretty near the footstalk; the males grow in oblong aments; and between these the female are collected in the form of cones. A native of Siberia and Canada. There are two other varieties, denominated the American sweet-scented, and variegated-leaved.

2. T. orientalis. Chinese arbor vitæ. Cones spreading every way with sharp scales; branches erect. The branches grow closer together, are much more adorned with leaves, and the leaves of a much brighter green than in the last; the cones are much larger, and of a beautiful grey colour. A native of Japan and China.

They may both be increased by seeds, layers, and cuttings. the seeds should be obtained from abroad; the layers made from the young shoots of one or two years growth; and the cuttings from the strongest young shoots of the same year's growth.

THULE, an island in the most northern parts of the German ocean, to which, on account of its great distance from the continent, the ancients gave the epithet of *ultima*. Some suppose that it is the island now called Iceland, or part of Greenland, others that it is Foula or Fula.

THUMB. *s.* (ðuma, Sax.) The short strong finger answering to the other four (*Broome*).

To THUMB. *v. n.* To handle awkwardly.

THUMB-BAND. *s.* (*thumb* and *band.*) A twist of any materials made thick as a man's thumb (*Mortimer*).

THU'MBSTAL. *s.* (*thumb* and *stall.*) A thimble.

THUMERSTONE, in mineralogy. See SCORLUS.

THUMMIM. See URIM.

THUMP. *s.* (*thombo*, Italian.) A hard heavy dull blow with something blunt (*Dry.*).

To THUMP. *v. a.* To beat with dull heavy blows (*Shakspeare*).

To THUMP. *v. n.* To fall or strike with a dull heavy blow (*Hudibras*).

THU'MPER. *s.* (from *thump.*) The person or thing that thumps.

THUN, a town of Swisserland, capital of a bailiwic, in the canton of Bern, with a castle. It is seated on a lake of the same name, 14 miles long and three broad, where the river Aar issues from it, 15 miles S. by E. of Bern.

THUNBERGIA, in botany, a genus of the class didynamia, order angiospermia. Calyx double; the outer two-leaved, inner twelve-toothed; corol campanulate; capsule beaked, two-celled. Two species: one of the Cape, with square hairy stem and yellow flowers; the other of the East Indies, very much resembling convolvulus sepium.

THUNDER. There is not one of the appearances of nature which has so much engaged the attention of mankind as thunder. The savage, the citizen, and the philosopher, have observed it with dread, with anxiety, and with curiosity; and the philosopher of our times treats the others with a smile of condescension, while he here enjoys the fullest triumph of his superiority.

Felix qui potuit rerum cognoscere causas,
Atque metus omnes et inevitabile fulmen
Subjecit pedibus.

But though this grand phenomenon has long engaged the curious attention of philosophers, it is but very lately that they have been able to explain it; that is, to point out the more general law of nature of which it is a particular instance. Inflammable vapours had long furnished them with a sort of explanation. The discovery of gunpowder, and still more that of inflammable air, gave some probability to the existence of extensive strata of inflammable vapours in the upper regions of the atmosphere, which, being set on fire at one end, might burn away in rapid succession, like a train of gunpowder. But the smallest investigation would shew such a dissimilarity in the phenomena and in the general effects, that this explanation can have no value in the eyes of a true naturalist. Horrid explosion, and a blast which would sweep every thing from the surface of the earth, must be the effects of such inflammation. The very limited and capricious nature of the ravages made by thunder render them altogether unlike explosions of elastic fluids.

No sooner were the wonderful effects of the charged electrical phial observed, than naturalists began to think of this as exhibiting some resemblance to a thunder-stroke (see ELECTRICITY); but it was not till toward the year 1750 that this resemblance was viewed in a proper light by the celebrated Franklin. In a dissertation written that year, he delivers his opinion at large, and notices particularly the following circumstances of similarity.

1. The colour and crooked form of lightning, perfectly similar to that of a vivid electrical spark between distant bodies, and unlike every other appearance of light. This angular, desultory, capricious form of an electrical spark, and of forked lightning, is very singular. No two successive sparks have the same form. Their sharp angles are unlike every appearance of motion through unresisting air. Such motions are always curvilineal. The spark is like the simultaneous existence of the light in all its parts; and the fact is, that no person can positively say in which direction it moves.

2. Lightning, like electricity, always strikes the most advanced objects—hills, trees, steeples.

3. Lightning affects to take the best conductors of electricity. Bell wires are very frequently destroyed by it. At Leven house in Fifeshire, in 1733, it ran along a gilded moulding from one end of the house to the other, exploding it all the way, as also the tinfoil on the backs of several mirrors, and the gilding of screens and leather hangings.

4. It burns, explodes, and destroys these conductors precisely as electricity does. It dissolves metals; melts wires; it explodes and tears to pieces bodies which contain moisture. When a person is killed by lightning, his shoes are commonly burst. When it falls on a wet surface, it spreads along it. The Royal William, in Louisburgh harbour, in 1758, received a thunder-stroke, which dissipated the maintop-gallant mast in dust, and came down on the wet decks in one spark, which spread over the whole deck as a spout of water would have done. This is quite according to electrical laws.

5. It has sometimes struck a person blind. Electricity has done the same to a chicken which it did not kill.

6. It affects the nervous system in a way resembling some of the known effects of electricity. The following is a most remarkable instance: —— Campbell, Esq. of Succoth, in Dunbartonshire, had been blind for several years. The disorder was a gutta serena. He was led one evening along the streets of Glasgow by his servant Alexander Dick, during a terrible thunder storm. The lightning sometimes fluttered along the streets for a quarter of a minute without ceasing. While this fluttering lasted, Mr. Campbell saw the street distinctly, and the changes which had been made in that part by taking down one of the city gates. When the storm was over, his entire blindness returned.—We have from a friend another instance, no less remarkable. One evening in autumn he was sitting with a gentleman who had the same disorder, and he observed several lambent flashes of lightning. Their faces were turned to the parlour window; and immediately after a flash, the gentleman said to his wife, "Go, my dear, make them shut the white gate; it is open, you see." The lady did so, and returned; and, after a little, said, "But how did you know that the gate was open?" He exclaimed, "My God! I saw it open, and two men look in, and go away again," (which our friend also had observed). The gentleman, on being close questioned, could not recollect having had another glance, nor why it had not surprised him; but of the glimpse itself he was certain, and described the appearance very exactly.

7. Lightning kills; and the appearances perfectly resemble those of a mortal stroke of electricity. The muscles are all in a state of perfect relaxation, even in those situations where it is usually otherwise.

8. Lightning is well known to destroy and to change the polarity of the mariner's needle.

Dr. Franklin was not contented with the bare observation of these important resemblances. He availed himself of many curious discoveries which he had made of electrical laws. In particular, having observed that electricity was drawn off at a great distance, and without the least violence of action, by a sharp metallic point, he proposed to philosophers to erect a tall mast or pole on the highest part of a building, and to furnish the top of it with a fine metalline point, properly insulated, with a wire leading to an insulated apparatus for exhibiting the common electrical appearances. To the whole of this contrivance he gave the name of thunder-rod, which it still retains. He had not a proper opportunity of doing this himself at the time of writing his dissertation in a letter from Philadelphia to the Royal Society of London; but the contents were so scientific, and so interesting, that in a few weeks time they were known over all Europe. His directions were followed in many places. In particular, the French academicians, encouraged by the presence of their monarch, and the great satisfaction which he expressed at the repetition of Dr. Franklin's most instructive experiments, which discovered and established the theory of positive and negative electricity, as it is still received, were eager to execute his orders, making his grand experiment, which promised so fairly to bring this tremendous operation of nature not only within the pale of science, but within the management of human power.

But, in the mean time, Dr. Franklin, impatient of delay, and perhaps incited by the honourable desire of well deserved fame, put his own scheme in practice. His inventive mind suggested to him a most ingenious method of presenting a point to a thunder cloud at a very great distance from the ground. This was by fixing his point on the head of a paper kite, which the wind should raise to the clouds, while the wet string that held it should serve for a conductor of the electricity. We presume that it was with a palpitating heart that Dr. Franklin, unknown to his neighbours, and accompanied only by his son, went into the fields, and sent up his messenger that was to bring him such news from the heavens. He told a person, who repeated it in the hearing of the present writer, that when he saw the fibres of the cord raise themselves up like hogs bristles, he uttered a deep sigh, and would have wished that moment of joy to have been his last. He obtained but a few faint sparks from his apparatus that day; but returned to his house in a state of perfect happiness, now feeling that his name was never to die. Thus did the soap-bubble, and the paper kite, from being the playthings of children, become, in the hands of Newton and of Franklin, the means of acquiring immortal honour, and of doing the most important service to society.

We may justly consider this as one of the greatest of philosophical discoveries, and as doing the highest honour to the inventor; for it was not a suggestion from an accidental observation, but arose from a scientific comparison of facts, and a sagacious application of the doctrine of positive and negative electricity; a doctrine wholly Dr. Franklin's, and the result of the most acute and discriminating observation. It was this alone that suggested the whole; and by explaining to his satisfaction the curious property of sharp points, gave him the courage to handle the thunderbolt of Jove.

It is then a point fully ascertained, that thunder and lightning are the electric snap and spark, as much superior to our puny imitations as we can conceive from the immense extent of the instruments in the hands of Nature. If, says Dr. Franklin, a conductor one foot thick and five feet long will produce such snaps as agitate the whole human frame, what may we not expect from a surface of 10,000 acres of electrified clouds? How loud must be the explosion? How terrible the effects?

This discovery immediately directed the attention of philosophers to the state of the atmosphere with respect to electricity; and in this also Dr. Franklin led the way. He immediately erected his thunder-rods; and they have been imitated all over the world, with many alterations or improvements, according to the different views and skill of their authors.

The general appearances of a thunder storm are nearly as follow:

For the most part the wind is gentle, or it is calm. A low dense cloud begins in a place previously clear: this increases fast in size; but this is only upwards, and in an arched form, like great bags of cotton. The lower surface of the cloud is commonly level, as if it rested on a glass pane.

Soon after appear numberless small ragged clouds, like flakes of cotton teazled out. These are moving about in various uncertain directions, and continually changing their ragged shape. This change, however, is generally by augmentation. Whatever occasions the precipitation of the dissolved water seems to gain ground. As these clouds move about, they approach each other, and then stretch out their ragged arms toward each other. This is not by an augmentation, but by a real bending of these tatters towards the other cloud. They seldom come into contact; but after coming very near in some parts, they as plainly recede, either in whole, or by bending their arms away from each other.

But during this confused motion, the whole mass of small clouds approaches the great one above it; and when near it, the clouds of the lower mass frequently coalesce with each other before they finally coalesce with the upper cloud: but as frequently the upper cloud increases without them. Its lower surface from being level and smooth, now becomes ragged, and its tatters stretch down towards the others, and long arms are extended towards the ground. The heavens now darken apace, the whole mass sinks down; wind arises, and frequently shifts in squalls; small clouds are now moving swiftly in various directions; lightning now darts from cloud to cloud. A spark is sometimes seen co-existent through a vast horizontal extent, of a crooked shape, and of different brilliancy in its different parts. Lightning strikes between the clouds and the earth —frequently in two places at once. A continuation of these snaps rarifies the cloud; and in time it dissipates. This is accompanied by heavy rain or hail; and then the upper part of the clouds is high and thin.

During this progress of the storm, the thunder rod is strongly electrified; chiefly when the principal cloud is over head. The state of the electricity frequently changes from positive to negative—almost every flash, however distant, occasions a sudden start of the electroscope, and then a change of the electricity. When the cloud is more uniform, the electricity is so too.

The general scene of thunder is the heavens; and it is by no means a frequent case that a discharge is made into the earth. The air intervening between the earth and the lowest coating is commonly very much confused in consequence of the hills and dales, which, by altering the currents of the winds, toss up the inferior parts, and mix them with those above. This generally keeps the earth pretty much in the same electrical state as the lowest stratum of clouds.

Nor are the great thunder storms in general instances of the restoration of equilibrium between two strata immediately incumbent on each other. They seem, for the most part, to be strokes between two parcels of air which are horizontally distant. This, however, we do not affirm with great confidence. Our chief reason for thinking so is, that in these great storms the spark or shaft of forked lightning is directed horizontally, and sometimes is seen at once through an extent of several miles.

The nature of this spark has not, we think, been properly considered. It is simply compared to a long electrical spark, which is conceived to be drawn through pure air, and is considered as marking the actual transference of electricity from one end to the other. But this we doubt very much. We are certain of having observed shafts of lightning at one and the same instant stretching horizontally, though with many capricious zigzags and lateral sputterings, at least five miles. We cannot conceive this to have been the striking distance, because the greatest vertical distance of the strata is not the half of this. We rather think that it is a simultaneous range of discharges, each accompanied with light, differently bright, according to the electrical capacity of the cloud into which it is made; and if there is a real transference of electric matter on this occasion (which we do not affirm), it is only of a small quantity from one cloud to the next adjoining. This we think confirmed by the sound of thunder. It is not a snap, incomparably louder than our loudest snap from coated glass; but a long continued, rumbling, and very unequable noise. There is no doubt but that this snap was almost simultaneous through the whole extent of the spark; but its different parts are conveyed to our ear in time, and are therefore heard by us in succession; and it is not an uniform roar, but a rumbling noise, unequally loud, according as the different parts of the snap are indeed differently loud. We should hear a noise of the same kind if we stood at one end of a long line of soldiers, who discharged their musquets (differently loaded) in the same instant. When any part of the spark is very near us, and is not very diffuse, the snap begins with great smartness, and continues for some time, not unlike the violent tearing of a piece of strong silk; after which it becomes more and more mellow as it comes from a greater distance. We do not, however, affirm, that the whole extensive spark and snap are co-existent or simultaneous. The cloud is, in all probability, but an indifferent conductor, and even a sensible time may elapse during the propagation of the spark to a great distance. Beccaria observed this in a line of 250 feet of chain, lying loosely on the ground, and consisting of near 6000 links. He thought that it employed a full second; but when the chain was gently stretched, the communication seemed instantaneous.

We cannot help thinking that even the electrical snap between two metal knobs is of the same kind. Not a quantity of luminous matter which issues from the one and goes to the other, but a light that is excited or produced in different material interjacent particles of air or other interposed matter. The angular and sputtering form is quite incompatible with the motion of a simple luminous point. Nay, our chemical knowledge here comes in aid, and obliges us to speculate about the manner in which this light is produced. Whence does it come? It may be produced by two knobs of ice. We know that water consists of vital and inflammable air, which have already emitted the light which made an ingredient of their composition. The spark therefore does not come from the ice. Is it then from the air? If so, perhaps water is produced, or rather something else, for there is not always inflammable air at hand to compose water. Yet the transference of electricity has decomposed the air, or has robbed it of part of its light. The remainder may not be water; but it is no longer air. Is not this confirmed by the peculiar smell which always accompanies electric sparks? and the peculiar taste, not unlike the taste felt on the tongue when it is touched by the zinc in the experiments on Galvanism? Even the fine pencil of light which flows from a point positively electrified, appears through a magnifying glass to consist, not of luminous lines, but of lines of luminous points. And these points are of different brilliancy and different colour, both of which are incessantly changing. And be it farther observed, that these lines are curves, diverging from each other, and convex to the axis. This circumstance indicates a mutual repulsion, arising, in all probability, from the expansion of the air. And, lastly, no spark nor light of any kind can be obtained in a space perfectly void of air.

All these circumstances concur in explaining the nature of the shaft of forked lightning. It is a series of appearances excited in the intervening medium, and which produce some chemical change in it. Thunder, when it strikes a house, always leaves a peculiar smell. Inflammable air has also a peculiar and very disagreeable smell. The smell produced by electricity greatly resembles the smell produced by striking two pieces of quartz together.

Mr. Deluc supposes that the electrical spark, as it is exhibited in thunder, is always accompanied by the decomposition of air now so familiarly known, and that this is the origin of the deluge of rain which commonly finishes the storm. But this is not in the smallest degree probable. The decomposition extends surely no farther than where the light is separated; and we should no more expect a deluge of rain, even if we had inflammable air ready at hand, than we expect drops of water in our electrical experiments. Something different from water follows this decomposition, total or partial, of the vital air; and the water which we do observe to accompany thunder is no more than what we should expect from the copious precipitation of water in a cloudy form. Mr. Saussure's observations assure us, that the particles of a cloud are vesicles. Indeed no person who has looked narrowly at a fog, or has observed how large the particles are of the cloud which forms in a receiver, when we suddenly diminish the density of the air, and who observes how slowly these particles descend, can doubt of their being hollow vesicles. We cannot perhaps explain their formation; but there they are. We can hardly conceive them receiving the commotion which accompanied the snap without collapsing by the agitation. Perhaps the very cessation of their electricity may produce this effect. They will therefore no longer float in the air, but fall, and unite, and come to the ground in rain. We may expect this rain to be copious, for it is the produce of two strata of clouds. It greatly contributes to the putting an end to the storm, by passing through the strata, and helping to restore the equilibrium.

One may at first expect that a single clap of thunder will restore the equilibrium of any extent of clouds, and we require an explanation of their frequent repetition before this is accomplished. This is not difficult, and the fact is a confirmation of the above theory, which is considerably different from the generally received notions of the subject. We consider the stratum of clear air as the charged electric; positive on one side, and negative on the other, and coated with conducting clouds. When the discharge is made, the state of electricity is indeed changed through the whole stratum, but the equilibrium is by no means completed. The stratum is perhaps a quarter of a mile in thickness. The discharge does not immediately affect all this; but does it superficially, leaving the rest unbalanced. It is like the residuum which is left in a Leyden phial when the discharge has been made by means of a spark drawn at a distance. It is still more like the residuum of the discharge of a Leyden phial that is coated only in patches on one side. Each of these patches discharge what is immediately under it and round it to a certain small distance, but leaves a part beyond this still charged. This redundant electricity gradually diffuses itself into the spaces just now discharged; and, after some considerable time has elapsed, another discharge may be made. In like manner, the electricity remaining in the interior of the stratum diffuses itself, comes within the action of the coating, and may be again discharged by a clap of thunder. We have a still better parallel to this in Beccaria's experiments with two or more plates of glass laid together. After the first discharge, the internal surfaces will exhibit certain electricity. Lay the plates together, and, after some time, the electricity of the inner surfaces will be different, and another discharge may be obtained.

Magnetism affords the best illustration of this. If a magnet be brought near a piece of soft iron, lying below a paper on which iron filings are lightly strewed, it will instantly induce a north pole on one end and a south pole on the other; and this will be distinctly observed by the way in which these filings will arrange themselves. But if, instead of soft iron, we place a bar of hard tempered steel, the south pole will be but a small matter removed from the north pole; but by continuing the magnet long in the same place, the distribution of magnetism in the piece of hard steel will gradually advance along the bar, and after a long time the neutral point will be almost in the middle of the bar, and the south pole will be at the farther end. See MAGNETISM.

We said that the clouds were the usual scenes of the violent electrical phenomena. We imagine that the greatest part of the thunder strokes which have been felt have been of the kind which lord Mahone, now lord Stanhope, calls the returning stroke. If two clouds A and B are incumbent over the plain *a* and *b*; and if A be positive and B negative, the earth will be maintained in a negative state at *a*, and a positive state at *b*. If the discharge be now made between the clouds A and B, the electricity must instantly rush up through a conductor at *a*, and down through one at *b*, and each place will have a stroke. The same thing will happen if the negative cloud B is above the positive cloud A, but not in so great a degree; for the negative electricity at *a* will now be much less than in the other case, because it is induced only by the prevalence of the positive cloud A over the more remote negative cloud B.

This returning stroke explains, much better than we can by any direct stroke, the capricious effects of thunder. A person at Vienna received a terrible shock by having his hand on a thunder-rod during a violent explosion which he saw above three miles distant. Sparks are observed at thunder-rods at every the most distant flash of lightning.

Beccaria has a different theory of thunder. He imagines that the different parts of the earth are in different states of electricity, and that the clouds are the restoring conductors. But this does not accord with what we know of electricity. The earth is so good a conductor, that Dr. Watson could not observe any time lost in communicating the electricity to the distance of more than four miles. It is very true, that the earth is almost always in a state of very unequal, and even opposite, electricity in its different parts; but this arises from the variety of clouds strongly electrified in the opposite way. This induces electricity, or disturbs the natural uniform diffusion of electricity, just as the bringing magnets or loadstones into the neighbourhood of a piece of iron, without touching it, renders it magnetical in its different parts. While they continue in their places, the piece of iron will be magnetical, and differently so in its different parts.

Such are the thoughts which occur to us on this subject. But we by no means affirm that we have given a full account of the procedure of Nature; we have only pointed out several necessary consequences of the known laws of electricity, and of its production in the atmosphere by means of natural operations which are continually going on. These must operate, and produce an electrical state of the atmosphere greatly resembling what we observe: and we have shewn, from the acknowledged doctrines of electricity, how this want of equilibrium may be removed, and must be removed, by the same operations of nature. The equilibrium must be restored by means of the conducting coating furnished by the clouds. But these may be the least considerable of nature's resources; and the subject is still an unexplored field, in the examination of which we may hope to make great progress, in consequence of our daily increasing knowledge of the chemical state of the atmosphere.

Maxims in a Thunder-Storm.

Avoid being under trees—but be near them: do not avoid rain. When in a room, avoid the fire-side, which would bring you into the neighbourhood of the highest part of the house, viz. the stack of chimneys. The bell-wire, the grate, the fire irons—are bad neighbours. Nay, the soot of the chimney is not a good one, especially if it has ever caked together by burning. Go to the middle of the room, and sit down, if not near a lustre, or any thing hanging from the ceiling. Avoid mirrors, or gilded mouldings.

To THU′NDER. *v. n.* (from the noun.) 1. To make thunder (*Shakspeare*). 2. To make a loud or terrible noise (*Pope*).

To THU′NDER. *v. a.* 1. To emit with noise and terrour (*Dryden*). 2. To publish any denunciation or threat (*Ayliffe*).

THU′NDERBOLT. *s.* (*thunder* and *bolt*, as it signifies an arrow.) 1. Lightning; the arrows of heaven (*Addison*). 2. Fulmination; denunciation: properly ecclesiastical (*Hakewill*).

THU′NDERCLAP. *s.* (*thunder* and *clap.*) Explosion of thunder (*Dryden*).

THU′NDERER. *s.* (from *thunder.*) The power that thunders (*Waller*).

THU′NDEROUS. *a.* (from *thunder.*) Producing thunder (*Milton*).

THU′NDERSHOWER. *s.* (*thunder* and *shower.*) A rain accompanied with thunder.

THUNDER-STONE. Thunder-bolt, among petrifactions. See HELMINTHOLITHUS.

To THU′NDERSTRIKE. *v. a.* (*thunder* and *strike.*) 1. To blast or hurt with lightning (*Sidney*). 2. To astonish with any thing terrible (*Chapman*).

THUR, a river of Swisserland, which rises in the S. part of the county of Toggenburg, and flows into the Rhine, seven miles S.S.W. of Schaffhausen.

THURGAU, a new canton of Swisserland, which lies along the river Thur; bounded on the S. by the canton of St. Gall, W. by that of Zurich, and N. and E. by the lake and territory of Constance. It is extremely populous, and the most pleasant and fertile part of Swisserland, though somewhat mountainous toward the south. One-third of the inhabitants are catholics, and the other two-thirds are Calvinists. Frauenfeld is the capital.

THU′RIFEROUS. *a.* (*thurifer*, Lat.) Bearing frankincense.

THURIFICA′TION. *s.* (*thuris* and *facio*, Latin.) The act of fuming with incense; the act of burning incense (*Stillingfleet*).

THURINGIA, a province of Germany, in the circle of Upper Saxony; bounded on the E. by Misnia, S. by Franconia, W. by Hesse and Eichfeld, and N. by the duchy of Brunswick and the principality of Anhalt. It is 73 miles in length, and nearly as much in breadth, abounding in corn, fruits, and wood. It belongs to the duke of Saxony and several petty sovereigns. Erfurt and Langensalza are the chief towns.

THURIS CORTEX. The cascarilla and eleuthera barks were so called. See CASCARILLA.

THURLOE (John), secretary to the Cromwells, was born 1616, at Abbots-Roding, Essex. He was educated for the law, and in 1645 was secretary to the parliamentary commissioners at the treaty of Uxbridge. Though connected with republican leaders, he was not accessary to the king's death; but he favoured with all his might the affairs of the commonwealth, and in 1653 became secretary of state to Cromwell. In 1656 he was member for Ely, and on Cromwell's death he continued in his office under Richard, over whom he had great influence, and at the restoration he made a tender of his services, which, however, were not accepted. He was accused soon after of high treason, but released, and then he retired to Great Milton, Oxfordshire. His knowledge of political affairs was such, that Charles solicited him in vain to take a share in the administration. He died suddenly 1668, aged 51. In his character he was very amiable, and remarkable for his courtesy and mildness to persons of all parties. His state papers, in seven vols. folio, are valuable.

THURLOW (Edward, lord), was born in 1735, at Ashfield, Norfolk, and after passing some time at Cambridge, he came to London to study the law. He was called to the bar 1758, and raised himself to notice by his manly opposition to sir Fletcher Norton. In the Douglas cause he displayed such abilities, that the public attention was turned towards him, as formed to fill the highest stations in the law. In 1770 he was appointed solicitor general, and the next year was attorney general. In June 1778 he was created a peer, and the day following nominated lord high chancellor of Great Britain. This office he resigned in 1783, but on the re-admission of Mr. Pitt into the cabinet, he again was promoted to the seals, and kept them till 1793. Since that time he lived in retirement, and died after an illness of two days at Brighthelmstone, 12th Sept. 1806. His character as a lawyer is fixed on the firmest basis of extensive knowledge, quick penetration, correct judgment, and the most undeviating integrity. Though overbearing in his manners, he was zealously attached to his party, and inflexible in his opinions, and loyal in his conduct. As a patron of church preferment, he was the friend of persevering industry and active merit, and though lax in his private conduct, he was ever anxious to reward virtue. In his court, with a powerful mind which quickly comprehended and discussed with clearness the most intricate cases, he pronounced his judgment by the strictest rules of equity, alike anxious to protect the rights and the privileges of the poor, as the immunities of the great. He was, as has been well observed, among lawyers and orators, in the senate, and in the courts, what his contemporary Johnson was among wits and authors, a mighty genius proudly elevated above the littleness of common minds. (*Lempriere*).

THU'RSDAY. *s.* (*thorsgday*, Danish; from *thor.* *Tho* was the son of Odin, yet in some of the northern parts they worshipped the supreme Deity under his name (*Stillingfleet*). The fifth day of the week.

THURSO, a borough of Scotland, in Caithnesshire, at the mouth of the river Thurso, on the S.W. side of a spacious bay. It has a considerable trade in corn and fish, and manufactures of woollen and linen cloth. It is 28 miles N.W. of Wick, and 56 N.N.E. of Dornoch. Lon. 3. 18 W. Lat. 58. 30 N.

THUS. *ad.* (ðuꞅ, Saxon.) 1. In this manner; in this wise (*Dryden*). 2. To this degree; to this quantity (*Wake*).

Thus, in sea language, a word used by the pilot in directing the helmsman or steersman to keep the ship in her present situation when sailing with a scant wind, so that she may not approach too near the direction of the wind, which would shiver her sails, nor fall to leeward, and run farther out of her course.

Thus. (θυος, from θυω, to sacrifice.) See Olibanum.

Thus judæorum. See Thymiama.

Thus masculum. See Olibanum.

THUYA, in botany. See Thuja.

To THWACK. *v. a.* (ðaccian, Saxon.) To strike with something blunt and heavy; to thrash; to bang (*Arbuthnot*).

Thwack. *s.* (from the verb.) A heavy hard blow (*Hudibras*).

THWART. *a.* (ðpẏꞃ, Saxon; *dwars*, Dutch.) 1. Transverse; cross to something else (*Milton*). 2. Perverse; inconvenient; mischievous.

To Thwart. *v. a.* 1. To cross; to lie or come cross any thing (*Thomson*). 2. To cross; to oppose; to traverse; to contravene (*Pope*).

To Thwart. *v. n.* To be in opposition to (*Locke*).

THWA'RTINGLY. *ad.* (from *thwarting.*) Oppositely; with opposition.

THY. *pro.* (ðin, Saxon.) Of thee; belonging to thee; relating to thee; the possessive of *thou.* See Thou.

THYESTES, son of Pelops and Hippodamia, and grandson of Tantalus, debauched Ærope, the wife of his brother Atreus, because he refused to take him as his colleague on the throne of Argos. This was no sooner known, than Atreus divorced Ærope, and banished Thyestes from his kingdom, but soon after recalled him to Argos. Thyestes was received by his brother at an elegant entertainment, but was soon informed that he had been feeding upon the flesh of one of his own children. This Atreus took care to communicate to him by showing him the remains of his son's body. Thyestes escaped from his brother, and fled to Epirus. Some time after, in a grove sacred to Minerva, he offered violence to his daughter Pelopeia, without knowing who she was. The daughter, pregnant by her father, was seen by her uncle Atreus and married, and some time after she brought into the world a son, whom she exposed in the woods. The life of the child was preserved by goats; he was called Ægysthus, and presented to his mother, and educated in the family of Atreus. When grown to years of maturity, the mother gave her son Ægysthus a sword, which she had taken from her unknown ravisher in the grove of Minerva, with hopes of discovering who he was. Meantime Atreus sent Agamemnon and Menelaus to pursue Thyestes, and when they found him, he was dragged to Argos, and thrown into a close prison. Ægysthus was sent to murder Thyestes, who recollected the sword raised to stab him, and a few questions convinced him that his assassin was his own son. Pelopeia, when she found that she had committed incest with her father, asked Ægysthus to examine the sword, and immediately plunged it into her own breast. Ægysthus rushed from the prison to Atreus, with the bloody weapon, and murdered him. At the death of Atreus, Thyestes was placed on his brother's throne by Ægysthus, from which he was soon after driven by Agamemnon and Menelaus. (*Senec. Sophocl. Ovid.* &c.)

THYMBRA, in botany, a genus of the class didynamia, order gymnospermia. Calyx somewhat cylindrical, two-lipped, grooved on both sides with a villous line; style half two-cleft. Three species; natives of Macedonia, the south of Europe, and of Africa; of which the two following are cultivated.

1. T. spicata. Spiked thymbra. A shrubby plant with spiked purple flowers.

2. T. verticillata. Whorled thymbra. Also shrubby and with purple flowers, but in whorls.

Thymbra hispanica. The name given by Tournefort to the common herb mastich. See Marum vulgare.

Thymbra, a town of Lydia, near Sardes, celebrated for a battle fought there between Cyrus and Crœsus, in which the latter was defeated. The troops of Cyrus amounted to 196,000 men, besides chariots, and that of Crœsus was twice as numerous. There was at Thymbra a temple sacred to Apollo, who is thence called Thymbræus.

THYME, in botany. See Thymus.

Thyme (Mastic). See Satureia.

Thyme (Lemon). See Serpyllum citratum.

Thyme (Mother of). See Serpyllum and Thymus.

THYMELŒA. (from θυμα, an odour, because of its smell.) Spurge flax. Flax-leaved daphne. This plant, daphne gnidium; panicula terminali foliis lineari-lanceolatis accuminatis of Linnéus, affords the garou bark, which very much resembles that of our mezereum. Garou bark is to be immersed in vinegar for about an hour before it is wanted: a small piece, the size of a sixpence, thus steeped, is applied to the arm or any other part, and renewed once a day in winter and twice in summer. It produces a serous exudation from the skin without irritating or blistering. It is recommended, and is in frequent use in France and Russia against some diseases of the eyes.

THYMIAMA. (θυμιαμα, from θυμα, an odour, so called from its odoriferous smell.) Muskwood. Thus judæorum. A bark in small brownish grey pieces, intermixed with bits of leaves, seeming as if the bark and leaves had been bruised and pressed together, brought from Syria, Cilicia, &c. and supposed to be the produce of the liquid storax tree. This bark has an agreeable balsamic smell, approaching to that of liquid storax, and a subacrid bitterish taste accompanied with some slight adstringency.

THYMUS. Thyme. Stone basil. In botany, a genus of the class didynamia, order gymnospermia. Calyx two-lipped; the orifice closed with hairs: corol with the upper lip flat and emarginate. Twenty-four species, scattered over the globe, of which four are common to our own country. The following are cultivated.

1. T. serpyllum. Wild thyme. Indigenous to our heaths.

2. T. vulgaris. Garden thyme. A native of Spain and Siberia: has an agreeable aromatic smell, and a warm pungent taste. Its virtues are said to be resolvent, emmenagogue, tonic, and stomachic; yet there is no disease mentioned in which its use is particularly recommended by any writer on the materia medica.

3. T. mastichina. Mastic thyme. A shrub about a foot high; a native of Spain.

4. T. Virginicus. Virginian or savory thyme: with perennial root, but annual stalk, and white flowers, seldom in this country ripening into seeds. A native of America.

5. T. calamintha. Calamint: with peduncled whorls, found on our road sides in its wild state.

6. T. acinos. Wild basil. Flowers in whorls on a single foot-stalk. Found wild in our dry fields.

THYMUS CRETICUS. The plant which bears this name in some pharmacopœias is the satureja capitata of Linnéus, which possesses similar virtues to our thyme, but in a stronger degree.

THYMUS GLAND. (from ϑυμα, an odour; because of its fragrant smell.) A gland of considerable size in the fétus, situated in the anterior duplicature or space of the mediastinum, under the superior part of the sternum. An excretory duct has not yet been detected, but lymphatic vessels have been seen going from it to the thoracic duct. Its use is unknown.

THYNNUS, in zoology, a genus of the class insecta, order hymenoptera. Mouth horny, with an incurved mandible, the jaw short and straight: lip longer than the jaw, membranaceous at the tip, and trifid, the middle division emarginate; tongue very short, involute; feelers four, equal, filiform; antennas cylindrical, the first joint thicker. Four species; three natives of New South Wales, and one of Africa; for the most part about the size of a wasp.

THYREO-PHARYNGEUS, in myology. See CONSTRICTOR PHARYNGIS INFERIOR.

THYRO. Names compounded with this word belong to muscles which are attached to the thyroid cartilage; as,

T. ARYTENOIDEUS. (*musculus thyro-arytenoideus.*) A muscle situated about the glottis, which pulls the arytenoid cartilage forwards nearer to the middle of the thyroid, and consequently shortens and relâxes the ligament of the larynx.

T. HYOIDEUS. (*musculus thyro-hyoideus.*) A muscle situated between the os hyoides and trunk, which pulls the os hyoides downwards, and the thyroid cartilage upwards.

T. PHARYNGO-STAPHILINUS. See PALATO-PHARYNGEUS.

T. STAPHILINUS. See PALATO-PHARYNGEUS.

THYROID CARTILAGE. (*cartilago thyroidea,* from ϑυρεὸς, a shield, and ειδος, resemblance; from its supposed resemblance to a shield.) Scutiform cartilage. The cartilage which is placed perpendicular to the cricoid cartilages of the larynx, constituting the anterior, superior, and largest part of the larynx. It is harder and more prominent in men than in women, in whom it forms the pomum adami.

THYROID GLAND. (*glandula thyroidea.*) A large gland situated upon the cricoid cartilage, trachea, and horns of the thyroid cartilage. It is uncertain whether it be conglobate or conglomerate. Its excretory duct has never been detected, and its use is not yet known.

THYRSE, in botany. Thyrsus. (Θυρσος, from ϑυω, *impetu feror, erumpo,* to burst forth. Put for branches, or the flame of a lamp or torch; which have a conical form. Hence the spear with ivy bound about the head, carried in sacrifices to Bacchus, was named thyrsus.) Linnéus puts it for a species of inflorescence; and explains it to be a panicle contracted into an ovate form, as in syringa and petasites. Our gardeners have corrupted this term into truss.

THYSE'LF. *pronoun reciprocal.* (*thy* and *self.*) 1. It is commonly used in the oblique cases, or following the verb (*Shakspeare*). 2. In poetical or solemn language it is sometimes used in the nominative (*Dryden*).

TI'AR. TIA'RA. *s.* (*tiara,* Latin.) A dress for the head; a diadem (*Pope. Prior*).

TIARELLA, in botany, a genus of the class decandria, order digynia. Calyx five-parted; corol five-petalled, inserted into the calyx; the petals entire; capsule one-celled, two-valved; one of the valves larger. Two species; one a native of Asia and America, with heart-shaped leaves; the other of Asia, with ternate leaves.

TIBER, TYBERIS, or TIBRIS, a river of Italy, on whose banks the city of Rome was built. It was originally called Albula, from the whiteness of its waters, and afterwards Tiberinus, when the king of that name had been drowned there. The Tiber rises in the Apennines, and falls into the Tyrrhene sea, 16 miles below Rome, after dividing Latium from Etruria. That is, in the language of modern geographers, the Tiber rises in the Apennines, in the Florentino, flows through the Ecclesiastical State by Borgo, St. Sepulchro, Citta-di Castella, Orto, and Rome, 10 miles below which it enters the Mediterranean sea, between Ostia and Porto.

TIBERIAS (anc. geog.), the last town of Galilee, situated on the south side of the lake Tiberias; built by Herod the Tetrarch, and called Tiberias in honour of the emperor Tiberius; distant 30 stadia from Hippus, 60 from Gadara, and 120 from Scythopolis: whence it appears to have been at no great distance from where the Jordan runs out of the lake. It is a number of times mentioned by St. John the Evangelist. Pliny places it on the west extremity of the lake, commending the salubrity of its hot waters. Jerome says the ancient name was Chennereth; which, if true, will account for the name of the lake. An interesting account of the town and lake of Tiberias is given in the 2d vol. of Dr. Clarke's Travels.

TIBERIUS (Claudius Drusus Nero), a Roman emperor after the death of Augustus, was descended from the family of the Claudii. In his early years he commanded popularity by entertaining the populace with magnificent shows and fights of gladiators. His first appearance in the Roman armies was under Augustus, in the war against the Cantabri, and afterwards in the capacity of general, he obtained victories in different parts of the empire, and was rewarded with a triumph. After this he spent seven years in exile at Rhodes. He then returned to Rome, and was invested with the command of the Roman armies in Illyricum, Pannonia, and Dalmatia, and seemed to divide the sovereign power with Augustus, at whose death, Tiberius, who had been adopted, assumed the reigns of government; and with affected modesty he wished to decline the dangerous office, and to make the Romans believe that he was invested with the purple, not from his own choice, but by the recommendation of Augustus, and the urgent entreaties of the Roman senate. The beginning of his reign seemed to promise tranquillity to the world. Tiberius, however, was soon viewed in his real character. His ingratitude to his mother Livia, his cruelty to his wife Julia, and his tyrannical oppression and murder of many noble senators, rendered him odious to the people. The armies mutinied in Pannonia and Germany, but the tumults were silenced by the prudence of the generals. This acted as a check upon Tiberius in Rome; he knew from thence that his power was precarious. He therefore continued as he had begun, to pay the greatest deference to the senate, and observed, that in a free city, the thoughts and the tongues of every man should be free. While Rome exhibited a scene of peace and public tranquillity, Tiberius gained new honours, by the activity and valour of Germanicus and his other lieutenants. Yet the triumphs of Germanicus were beheld with jealousy. Tiberius dreaded his power, and therefore the death of that general in Antioch, was, as some suppose, accelerated by poison, and the secret resentment of the emperor. Not only his relations and friends, but the great and opulent were sacrificed to his ambition, cruelty, and avarice; and there was scarce in Rome one single family that did not reproach Tiberius for the loss of a brother, a father, or a husband. He at last retired to the island of Capreæ, on the coast of Campania, where he buried himself in unlawful pleasures. The care of the empire was entrusted to favourites, among whom was Sejanus. At last, grown weak and helpless through his infirmities, in his solitary retreat, he thought of his approaching dissolution; and he nominated as his successor Caius Caligula. Tiberius died at Misenum, the 16th of March, A. D. 37, in the 78th year of his age, after a reign of 22 years, six months, and 26 days. Caligula was accused of having hastened his end by suffocating him. The joy was universal when his death was known. The character of Tiberius has been examined with particular attention by historians, and his reign is the subject of the most perfect and elegant of all the compositions of Tacitus. Like the rest of the emperors, he received divine honours after death, and even during his life.

TIBET, or THIBET, a country of Asia, lying between 81 and 102 E. lon. and 25 and 40 N. lat. bounded on the N.W. and N. by the desert of Kobi, in Tartary, on the E. by China, on the S. by Assam and Burmah, and on the W. and S. W. by Hindustan Proper and Bootan. This country is one of the highest in Asia, it being a part of that elevated tract which gives rise not only to the rivers of India and China, but also to those of Siberia and Tartary. Its length from E. to W. cannot be less than 1000 miles; its breadth is very unequal. It is divided into three parts, Upper, Middle, and Lower Thibet. The Upper lies toward the sources of the Ganges and Burrampooter; the Middle is that in which Lassa, the capital, is seated; and the Lower, that which borders on China. Little Thibet is situated between Upper Thibet and Cashgur. But major Rennell, who considers the geography of the whole country as very obscure, is uncertain whether Little Thibet is subject to

Lassa or not. Notwithstanding the very rough and sterile state of Thibet, and the severity of its climate, from its wonderful elevation, its inhabitants are in a high state of civilization; their houses lofty and built of stone; and the useful manufactures in some degree of improvement. The Thibetians are governed by the grand lama, who is not only submitted to, and adored by them, but is also the great object of adoration for the various tribes of pagan Tartars, who walk through the vast tract of continent which stretches from the river Volga to Corea. He is not only the sovereign pontiff, the vicegerent of the deity on earth, but by the more remote Tartars is absolutely regarded as the deity himself. They believe him to be immortal, and endowed with all knowledge and virtue. Every year they come from different parts to worship, and each make offerings at his shrine. Even the emperor of China, who is of a Tartar race, does not fail to acknowledge the lama, in his religious capacity, although, as a temporal sovereign, the lama himself is tributary to that emperor. The opinion of the most orthodox Thibetians is, that when the grand lama seems to die, either of old age or infirmity, his soul, in reality, only quits a crazy habitation, to look for another younger or better; and it is discovered again in the body of some child, by certain tokens known only to the lamas or priests, in which order he always appears. In 1774, the grand lama was an infant, who had been discovered some time before by the tayoshoo lama, who, in authority and sanctity of character, is next to the grand lama, and during his minority acts as chief. The lamas, who form the most numerous as well as the most powerful body in the state, have the priesthood entirely in their hands; and they constitute many monastic orders, which are held in great veneration among them. Beside the religious influence and authority of the grand lama, he is possessed of unlimited power throughout his dominions. His residence is at Patoli, a vast palace, on a mountain, near the banks of the Burrampooter, seven miles from Lassa. In 1774, the English East India company made a treaty with the lama. The religion of Thibet, though in many respects it differs from that of the Indian bramins, yet in others has a great affinity to it. The Thibetians have a great veneration for the cow, and highly respect also the waters of the Ganges, the source of which they believe to be in heaven. The sunniasses, or Indian pilgrims, often visit Thibet as a holy place; and the lama always maintains a body of near 300 of them in his pay. See Palte.

TIBIA. (from *tuba*, a tube; so called from its pipe-like shape.) The largest bone of the leg. It is of a long, thick, and triangular shape, and is situated on the internal part of the leg. Its upper extremity is large, and flattened at its summit, where we observe two articulating surfaces, a little concave, and separated from each other by an intermediate irregular protuberance. Of these two cavities, the internal one is deepest, and of an oblong shape, while the external one is rounded, and more superficial. Each of these, in the recent subject, is covered by a cartilage, which extends to the intermediate protuberance, where it terminates. These two little cavities receive the condyles of the os femoris, and the eminence between them is admitted into the cavity which is seen between the two condyles of that bone; so that this articulation affords a specimen of the complete ginglimus. Behind the intermediate protuberance, or tubercle, is a pretty deep depression, which serves for the attachment of a ligament, and likewise to separate the two cavities from each other. Under the edge of the external cavity is a circular, flat surface, covered with cartilage, which serves for the articulation of the fibula; and at the fore part of the bone is a considerable tuberosity, of an inch and a half in length, to which the strong ligament of the rotula is fixed.

The body of the tibia is smaller than its extremities, and, being of a triangular shape, affords three surfaces. Of these, the external one is broad, and slightly hollowed by muscles above and below; the internal surface is broad and flat, and the posterior surface is narrower than the other two, and nearly cylindrical. This last has a slight ridge running obliquely across it, from the outer side of the upper end of the bone to about one third of its length downwards. A little below this we observe a passage for the medullary vessels, which is pretty considerable, and slants obliquely downwards. Of the three angles which separate these surfaces, the anterior one, from its sharpness, is called the spine or shin. This ridge is not strait, but describes a figure like an italic *ſ*, turning first inwards, then outwards, and lastly inwards again. The external angle is more rounded, and serves for the attachment of the interosseous ligament; and the internal one is more rounded still by the pressure of muscles.

The tibia enlarges again a little at its lower extremity, and terminates in a pretty deep cavity, by which it is articulated with the uppermost bone of the foot. This cavity, in the recent subject, is lined with cartilage. Its internal side is formed into a considerable process, called malleolus internus, which, in its situation, resembles the styloid process of the radius. This process is broad, and of considerable thickness, and from it ligaments are extended to the foot. At its back part we find a groove, lined with a thin layer of cartilage, in which slide the tendons of the flexor digitorum longus, and of the tibialis posticus; and a little behind this is a smaller groove, for the tendon of the flexor longus pollicis. On the side opposite to the malleolus internus, the cavity is interrupted, and immediately above it is a rough triangular depression, which is furnished with cartilage, and receives the lower end of the fibula.

The whole of this lower extremity of the bone seems to be turned somewhat outwards, so that the malleolus internus is situated more forwards than the inner border of the upper extremity of the bone.

In the fetus both ends of the tibia are cartilaginous, and become afterwards epiphyses.

TIBIAL ARTERIES. Arteriæ tibiales. The two principal branches of the popliteal artery: the one proceeds forwards, and is called the anterior tibial; the other backwards, and is called the posterior tibial; of which the external tibial, the fibular, the external and internal plantar, and the plantal arch, are branches.

TIBIALIS ANTICUS. (*musculus tibialis anticus.*) A flexor muscle of the foot, situated on the leg, which bends the foot by drawing it upwards, and at the same time turns the toes inwards.

TIBIALIS GRACILIS. See PLANTARIS.

TIBIALIS POSTICUS. (*musculus tibialis posticus.*) A flexor muscle of the foot, situated on the leg, which extends the foot, and turns the toes inwards.

TIBULLUS (Aulus Albius), a Roman knight, celebrated for his poetical compositions. He followed Messala Corvinus into the island of Corcyra, but soon dissatisfied with the toils of war, he retired to Rome, where he gave himself up to literary ease. His first composition was to celebrate the virtues of his friend Messala; but his more favourite study was writing love verses, in which he was the most correct of the Romans. He lost his possessions when the soldiers of the triumvirate were rewarded with lands; but he might have recovered them, if he had condescended, like Virgil, to make his court to Augustus. Four books of elegies are the only remaining pieces of his composition. They possess so much grace and purity of sentiment, that the writer is deservedly ranked as the prince of elegiac poets. Ovid has written a beautiful elegy on the death of his friend.

A very good edition of Tibullus is that published at Amsterdam, in 1708, in which, however, the editor Broukhusius sometimes takes unwarrantable liberties with the text. Vulpius's edition of 1749 is a very excellent one; but Heyne's last edition in 1777 is pronounced by Harwood to be faultless. Grainger's edition of 1759, in 2 vols. 12mo. contains also a good poetical translation, with some useful notes. See CATULLUS and PROPERTIUS.

TIBUR, an ancient town of the Sabines, built, as some say, by Tiburtus, the son of Amphiaraus. It was watered by the Anio.

TIBURTUS, the founder of Tibur, often called Tiburtia Mænia. He was one of the sons of Amphiaraus.

TIC DOLOUREUX. A singular and as yet unclassified disease of the nerves. Dr. Haighton gives the following interesting account of it, which is by much the best that has hitherto appeared in this country, and which, from its novelty and the success attending the method of cure, we have judged expedient to insert here.

Mrs. H——, of Stockwell, Surry, aged 74, a mother of children, of a spare habit, placid disposition, and for her age much disposed to activity, was about thirteen years ago, for the first time, seized with pain of the face. This pain at its commencement was very moderate, but in its progress became violent; at length it acquired a degree of acuteness which neither words can describe, nor the imagination easily conceive. The seat of this extreme pain was somewhat limited, being confined to the ala nasi and a small portion of the upper lip, on the right side. The pain was not of the continued obtuse kind, like that of chronic rheumatism, but on the contrary, rather transient, exceedingly acute and lancinating during its attack. The periods of its recurrence were indefinite, and in the intervals of which she was generally in a state of perfect ease. There was a striking uniformity both in the origin and direction of the pain: it always began in the ala nasi and upper lip, and darted upwards towards the orbit; but when the attack was more commonly violent, then indeed it extended to other parts, and a sensation of a similar kind, though much less in degree, was frequently perceived in the cheek towards the ear; the same sensation was also observed on the fleshy and bony palate, on the gums and teeth of the upper jaw, and sometimes on the fauces. She seemed particularly disposed to this pain in severe or windy weather. Yet she was not altogether free from it in the milder season. It was most frequently excited by the more obvious occasional causes, such as speaking, coughing, taking food, blowing the nose, &c. Though sometimes it would return from causes less apparent. The duration of each pain seldom exceeded half a minute; but more frequently it was somewhat less. Sometimes she had not more than five or six of these pains in the space of a day, at others nearly twice that number in an hour. They varied sensibly in their degree of violence; sometimes so moderate as only to suspend the movement of the upper lip, but more commonly so pungent as to extort screams expressive of intense agony. Besides the suspension of the motion of the lips, a very opposite effect frequently took place, viz. a tremulous movement, during which it was sometimes drawn a little upward. Notwithstanding there were such extreme pains, neither swellingn or discoloration could be perceived, except such as were occasioned from time to time by external applications. These were the general symptoms. The patient was in the north of England when she was first attacked with this complaint; and having availed herself of such assistance as was at hand without relief, she consulted Dr. Haighton by letter. As the case was drawn up by herself, though not without some appearance of accuracy, yet he did not conceive her statement of facts sufficiently perspicuous whereon to found an opinion. He therefore desired the case might be written out by some practitioner; but imagining herself capable of describing her own feelings as any other, she sent another account somewhat more correct than the former. From this statement Dr. Haighton began to suspect the complaint to be of the nervous kind; but at the same time considered it only in the vague sense in which we are too apt to use that term. That practitioner must have been either very fortunate, or his practice very circumscribed, who has not, in various instances, experienced the inefficacy of medicine in this class of diseases. However, the extreme agony in the present case made it highly expedient to attempt something for relief; and despairing to obtain a permanent advantage from the use of any thing which then occurred to him, Dr. Haighton recommended for the present an attention only to the urgency of symptoms by the application of the linimentum ammoniæ, of such a strength and such frequency of repetition as might produce the ordinary effects of rubifacient medicines, or on the inefficacy of this, the exhibition of tincture of opium both internally and externally; likewise electricity in such form as the patient could best bear. In case the above plan had moderated the violence of the attack, he added in reserve to recommend a free use of bark and chalybeates, and aided by wine, and a more nutritive diet than she had been accustomed to, with a view of strengthening the system, and, if possible, to defend it against future attacks; but unfortunately he had to deal with a patient somewhat unmanageable in this respect, being very averse to good living. Some time after this he was informed there had been an evident amendment in a way that seemed to imply a spontaneous termination of the disease, rather than an abatement of symptoms from the power of medicine; he was told that the advantage obtained from the local applications was so very equivocal that the amendment was attributed more to the mild turn the season took at that time, than to the medical treatment which had been adopted. He heard very little more of this case for the space of two years, at the expiration of which she came to reside in the vicinity of London. From her account, it seems that she had several returns of her complaint, but none so violent as the first attack. A few months after her arrival she had a slight return. She was placed upon an insulated chair, and several very strong electrical sparks were drawn from the part by means of a very powerful machine. It produced a redness, together with a slight vesication, and moderated the pain for several days. After that time it was frequently restrained by the same means: but at length it returned with a degree of violence unknown in any former attack, and upon trying electricity in the form of sparks, as before, it was so far from procuring a remission of symptoms, that it seemed to aggravate rather than appease. Under such extreme irritation Dr. Haighton ceased to draw sparks; but considering that some little advantage had been gained by electricity on a former trial, he used it in a milder form, viz. in what has been called the aura, which differs from the former mode in being drawn off silently, by means of a pointed conductor, but no visible effect ensued.

It was only at this period that he began to form a just idea of the disease. The following circumstance gave rise to it.

While she was endeavouring to describe her feelings, which she attempted in a very inarticulate manner, she stopped suddenly, and upon looking at the part affected, Dr. Haighton perceived a tremulous motion of the upper lip, by which it was drawn upwards precisely at that part where the musculus levator labii superioris proprius is inserted, and from recollecting a well known fact, that a nerve under irritation from stimulating causes, produces motion in the muscular parts to which it is distributed, it immediately occurred to him that the suborbitar branches of the fifth pair of nerves, which are known to supply these parts, must be the seat of the present disease.

In order, therefore, to reduce (as far as possible) to a certainty, what hitherto was only matter of surmise, he waited for the next exacerbation, which took place in a few minutes, and by making, at this time, rather a forcible pressure upon the integuments covering the suborbitar foramen, the pain instantly abated. He repeated this several times, and uniformly with the same effect. As the conjecture relative to the seat of this disease seemed to gain considerable support from this experiment, it was thought essential to take a more minute survey of the symptoms, particularly as being seated in those parts which seemed affected in a secondary or sympathetic way.

Now it appears from the history of this case, that the extreme pain was seated in the ala nasi and upper lip, on the right side; but when it darted with more than common violence, it affected other parts, as the ear, by extending itself along the course of the cheek, by means of communicating branches belonging to the portia dura of the seventh pair, which pair begin to spread on the side of the face as soon as it emerges from behind the condyles of the lower jaw. It attacked also the palate, gums, and teeth of the upper jaw, but no part of the lower; sometimes the fauces; but the part which seemed affected next in degree to the original seat, was immediately behind the dentes incisivi.

From comparing this assemblage of symptoms with the distribution of the second or superior maxillary portion of the fifth pair of nerves, he was struck with the coincidence, and at the same time was persuaded, as has been already hinted, that the original disease was in those branches of the nerve transmitted by the suborbitar foramen, and distributed to the ala nasi and upper lip; and that the darting pains extending to the teeth, inside of the gums, and palate, arose from communicating filaments between the suborbitar and palatine branches. These communications not only complicated the case, but also placed the prospect of a cure at a great distance, from the various channels by which the pain could be conveyed from the part primarily affected to the sensorium. But as a temporary advantage had been frequently gained by pressure of the suborbitar nerves against the bone, the entire division of them seemed eligible; and it was proposed to the patient as an ultimate expedient. The proposal, however, carried with it some difficulties. It was new to her. It could not ensure success, and in this distraction of circumstances, the mind of the patient might have remained suspended in doubt, had not the insupportable urgency of pain compelled her to assent.

Having permission to operate, Dr. Haighton began to consider the circumstances of this nerve more attentively, and as the intention was to effect a complete division of its filaments, by an incision of a moderate length, the means conducive to that end became important subjects of regard. It was essential therefore to acquire a knowledge concerning the precise seat of the distribution of this branch of the fifth pair of nerves, the mode of its transition, and exit from the suborbitar foramen, together with a clear and correct idea respecting the seat of the foramen itself. Besides which, it was not altogether extraneous to attend to such contiguous parts as might, either from necessity or accident, be wounded in the operation.

This nerve is transmitted by the suborbitar foramen, in a way very different from that which the common form of expression on this occasion would lead us to imagine. We usually speak of it as one branch, under the name of suborbitar; but in reality it ought to be considered as a series of branches, for it divides before its exit, and is afterwards distributed in a radiated manner to the circumjacent parts, viz. the levator labii superioris proprius, the inferior part of the orbicularis palpebrarum, to the muscles and integuments of the nose and upper lip.

From this radiated distribution, it must necessarily happen that the branches of this nerve are spread over an extensive surface at their termination, though contracted into a small compass at their exit from the foramen. It was therefore considered a matter of importance to fix upon a proper part for the operation, in order that its branches, by lying in a small space, might be more conveniently divided.

In its passage through the suborbitar foramen, it is accompanied by a branch of the internal maxillary artery, which from its contiguity must necessarily be divided. These are covered by the levator labii superioris proprius, and the common integuments.

As the branches of this nerve lie close to each other at the orifice of the foramen, that part seems the most convenient for their division, because an incision of a moderate length will generally include them all.

The next consideration was to determine the exact situation of the foramen.

This at first seems very easy, but in reality is not so, because in different skulls the distance of it from the orbit differs considerably, and there does not appear any mode of determining this more probably than by attempting to form a standard from the measurement of a considerable number of skulls.

The space between the inferior edge of the orbit and the superior part of the foramen in thirty skulls was therefore measured, and the distance found to be as follows.

In two skulls,	$\frac{3}{16}$ of an inch.
In 16 - - -	$\frac{1}{4}$
In 8 - - -	$\frac{5}{16}$
In 3 - - -	$\frac{3}{16}$
In 1 - - -	$\frac{1}{2}$

As the distance in 16 skulls out of 30 was $\frac{1}{4}$ of an inch, that is, considered as the medium distance from the superior part of the foramen; and if we allow $\frac{1}{8}$ below its inferior part, we consider $\frac{1}{2}$ of an inch from the lower edge of the orbit a proper place for performing the operation.

Having endeavoured to establish a rule for determining its distance from the orbit, it may be proper to ascertain its situation with respect to a line drawn from the inferior part of the internal angular process of the os frontis, obliquely across the orbit, to the centre of the os malæ.

The measurement of this line in 30 skulls did not vary more than $\frac{1}{8}$ of an inch, and it was found that a line drawn downward, perpendicular to this oblique line, at the distance of $\frac{7}{8}$ of an inch from the internal angle of the eye, passed across from the suborbitar foramen. By this rule Dr. Haighton was able to form a standard of the situation of this foramen in a living subject.

These preliminary circumstances being settled, the operation becomes exceedingly simple, and consists in an incision of $\frac{3}{4}$ of an inch in length, carried obliquely downwards, the centre of which must correspond with the foramen, only $\frac{1}{4}$ of an inch below it. The incision must be made down to the bone, otherwise we cannot be certain of dividing the nerves, as they are situated very deep. And as there are some irregularities on the surface of the maxillary bone at this part from muscular attachment, as well as a furrow which is sometimes continued from the foramen downwards, a small pointed knife will be preferable to any other, as it will enable the operator to divide with more certainty such nervous filaments as may be seated in these depressions.

The facial vein frequently passes over the foramen, and conceals it; from which it is liable to be divided in the operation. If this really happens, or if any of the suborbitar branches of the internal maxillary artery should bleed with freedom, a compress may be made with advantage, as they are seated near the bone.

The wound being dressed superficially, will probably heal by the first intention. In the manner just described, Dr. Haighton performed the operation, and the event has justly satisfied its propriety; it immediately put an end to the pain, and the incision healed in a few days.

The patient, who has now lived nine years since the operation, contemplates that event with the highest satisfaction.

It is worthy of remark, that the sensation and action of that side of the lip, though evidently diminished, were not altogether lost, as might have been predicted.

The inconvenience was only temporary: we may therefore suppose a reunion of the nerves had taken place, but with this fortunate effect, that no disposition to the return of the disease through the new formed part has yet appeared.

The complaint just described is not in the number of those which assail the human body with the greatest frequency, as there are physicians of considerable practice who have never met with it, and many who have not seen it more than once or twice. Very few of those to whom it has occurred have published their observations.

In the writings of the ancients scarcely any traces of it can be collected, and those so very obscure, that, like the ambiguous language of the oracles, they impress us with no definite meaning.

The first account we have of it, in which an intelligible description is given, is in a production of modern date, and forms a part of a treatise on the diseases of the urethra, by Monsieur André, surgeon of Versailles, published in the year 1756. In this he has given some practical observations on this subject, under the name of tic douleureux. In 1768 an inaugural dissertation was written on this disease, by Monsieur Vieillard, in which he mentions having seen this complaint several times at Paris. One object in his dissertation is to investigate the following question, viz. Uterum in pertinacibus capitis, facieque doloribus, aliquid prodesse section nervorum quinti paris? But the author denies that the operation can be performed with advantage. His conclusion, however, has not been well supported by the observations of others; for in the anatomical treatise of Monsieur Sabatior, it is asserted that this operation has been performed with success. The instances he quotes are, one from Dr. de Haen, which is mentioned in his ratio medendi, as the doctor's own proposal.

Another by Mr. Rich, a Polish surgeon of high respectability. A third case occurred at Paris, some years before the publication of his anatomical work, in which the success was only temporary.

In 1776, the late Dr. Fothergill published a very minute description of this complaint, in the fifth volume of the Medical Observations and Enquiries, and has stated the symptoms with a considerable degree of precision, so that any one who has read his account may very easily recognize the disease. Since the publication of Dr. Fothergill's paper, two memoirs on this subject have appeared in the Transactions of the Society of Medicine at Paris; one of which is written by Monsieur Thouret, the other by Monsieur Pujol. In these, several cases are collected and stated with great minuteness. By these writers it has been considered a nervous complaint, and in one case they made use of magnetism, but with very equivocal success. From the symptoms by which this complaint is distinguished, it is not difficult to decide concerning its nature. The kind of pain is very peculiar, and the course of it corresponds exactly with that of the nerves. The second branch of the fifth pair is perhaps more frequently affected than either the first or the third. But the portio dura of the seventh pair, which is distributed very extensively upon the face, under the name of pes anserinus, is more frequently the seat of this complaint than any of the branches of the fifth pair are; and this is a matter of considerable regret, because in such cases, neither the operation proposed in this paper, nor any other hitherto had recourse to, can avail. If, indeed, an operator, minutely versed in the situation of these different nervous filaments, were by an effort of skill and address to succeed in the undertaking, there is the highest probability that the patient would be relieved: but by reason of the manner in which this nerve spreads its branches, even where it is piercing the parotid gland, as well as the hazard of wounding contiguous parts, most prudent practitioners would decline the operation. Thus we see with how much more facility the mind can project, than the hand can execute.

When the seventh pair is affected, we can be at no loss to know; for the patient complains of a pain which begins in the fore part of the cheek, sometimes as high as the forehead, and extends itself in the direction of the ear. In a case of this kind, no relief whatever can be obtained by dividing the second branch of the fifth, as such division cannot possibly give any interruption to the communication between the sensorium and the seat of irritation.

To TICE. *v. a.* (from *entice.*) To draw; to allure (*Herbert*).

TICK, in entomology. See Acarus.

Tick. *s.* (contracted from *ticket*, a tally on which debts are scored.) 1. Score; trust (*Hudibras. Locke*). 2. The case which holds the feathers of a bed.

To Tick. *v. n.* (from the noun.) 1. To run on score. 2. To trust; to score (*Arbuthnot*).

Tick-biting. See Crib-biting.

Tick-seed (Sunflower). See Coreopsis.

TICKELL (Thomas), an excellent English poet, was the son of the Rev. Richard Tickell, and was born in 1686, at Bridekirk in Cumberland. He was educated at Queen's college, Oxford, of which he was made fellow; and while he continued at that university, he addressed to Mr. Addison a complimentary copy of verses on his opera of Rosamond, which introduced him to an acquaintance with that gentleman, who discovering his merit, became his sincere friend. On Mr. Addison's being made secretary of state, he appointed Mr. Tickell his under secretary; and on his being obliged to resign that office on account of his ill-health, he recommended him so effectually to Mr. Craggs, his successor, that he was continued in his post till that gentleman's death.

In 1724 Mr. Tickell was appointed secretary to the lords justices in Ireland, and enjoyed that place as long as he lived. He wrote some poems, which, when separately published, met with a favourable reception, and passed through several editions: they are now printed in the second volume of the Minor Poets. After Mr. Addison's death Mr. Tickell had the care of the edition of his works printed in 4 vols. 4to.; to which he prefixed an account of Mr. Addison's life, and a poem on his death. Mr. Tickell died in the year 1740.

TI'CKEN. Ti'cking. *s.* The same with *tick.* A sort of strong linen for bedding (*Bai.*).

TI'CKET. *s.* (*etiquet*, French.) A token of any right or debt, upon the delivery of which, admission is granted, or a claim acknowledged (*Spenser. Collier*).

To TI'CKLE. *v. a.* (*titillo*, Latin.) 1. To affect with a prurient sensation by slight touches (*Dryden*). 2. To please by slight gratifications (*Locke*).

To Ti'ckle. *v. n.* To feel titillation (*Sp.*).

Ti'ckle. *a.* Tottering; unfixed; unstable; easily overthrown (*Shakspeare*).

TI'CKLISH. *a.* (from *tickle.*) 1. Sensible to titillation; easily tickled (*Bacon*). 2. Tottering; uncertain; unfixed (*Woodward*). 3. Difficult; nice (*Swift*).

TI'CKLISHNESS. *s.* (from *ticklish.*) The state of being ticklish.

TI'CKTACK. *s.* (*trictac*, French.) A game at tables (*Bailey*).

TICUNAS. An Indian poison, the activity of which is greatly similar to another poison, called lama. M. Fontana observes, from the experiments he has tried, that the fume of this poison, whether inhaled or smelled to, is very innocent. That it was perfectly soluble in water, even cold, and in mineral acids as well as vegetable. That it did not effervesce with alkalies, nor acids, nor caused any change in milk. That it neither turned the acid of radishes red nor green. That this poison had no more effect when applied to the eye, than if it were bathed in water. That if taken internally it proves deleterious, but that a considerable quantity is required to kill even a small animal. By passing threads impregnated with the poison, and then dried, through the skins of rabbits and guinea pigs, and other animals, they died in a short time. If applied to the skin lightly scratched in birds and quadrupeds, it proves for the most part mortal, although not always.

A hundredth part of a grain will kill a small animal; but the poison must be dissolved, either to occasion death, or any disorder of the animal economy. Where there are fewer blood vessels, the poison is the least efficacious. If the poison be applied, being previously dissolved in the mineral acids, its effects seem to be destroyed. Rum and vinegar seem not to extinguish its effects; and even the acids seem useless and dangerous when applied to the muscles of an animal. It requires a more considerable time to act than the venom of the viper. The effects of both poisons may be remedied by a ligature round the limb, or by amputation, if done in time.

Mr. Fontana likewise observes, that this poison does not act on animals of cold blood. This poison hinders likewise the coagulation of the blood from those killed by it; but if introduced into the blood by the jugular vein, it produces death; and that it does not act on the nerves, but only on the blood. See Poisons (Vegetable).

TID. *a.* (ꞇẏꝺꝺeꞃ, Saxon.) Tender; soft; nice.

TI'DBIT. *s.* (*tid* and *bit.*) A dainty.

To TI'DDER. *To* Ti'ddle. *v. a.* (from *tid.*) To use tenderly; to fondle.

TIDE. *s.* (ꞇẏꝺ, Saxon; *tijd*, Dutch and Islandic.) 1. Time; season; while (*Spenser*). 2. Alternate ebb and flow of the sea. 3. Commotion; violent confluence (*Bac.*). 4. Stream; course (*Philips*).

To Tide. *v. a.* (from the noun.) To drive with the stream (*Dryden*).

To Tide. *v. n.* To pour a flood; to be agitated by the tide (*Philips*).

TIDES, two periodical motions of the waters of the sea; called also the *flux* and *reflux*, or the *ebb* and *flow*.

When the motion of the water is against the wind, it is called a *windward-tide*—when wind and tide go the same way, *leeward-tide*—when it runs very strong, it is called a *tide-gate.*

To tide it over or up into any place, is to go in with the tide, either ebb or flood, as long as that lasts; then to stay at anchor all the time of contrary tide; and thus to set in again with the return of the next tide.

It is said to *flow tide and half tide*, allowing six hours to a tide, when the tide runs three hours in the offing longer than it does by the shore; but, by longer, they do not mean its running more hours; but that, if it be high water ashore at twelve, it will not be so in the offing till three. An hour and a half longer makes tide and quarter-tide, three-fourths of an hour longer makes tide and half-quarter tide, &c.

The tides are found to follow periodically the course of the sun and moon, both as to time and quantity. And hence it has been suspected, in all ages, that the tides were somehow produced by the influence of these luminaries. Thus, several of the ancients, and among others, Pliny, Ptolemy, and Macrobius, were acquainted with the influence of the sun and moon upon the tides; and Pliny says expressly, that the cause of the ebb and flow is in the sun, which attracts the waters of the ocean; and adds, that the waters rise in proportion to the proximity of the moon to the earth. It is indeed now well known, from the discoveries of sir Isaac Newton, that the tides are caused by the gravitation of the earth towards the sun and moon. Indeed the sagacious Kepler, long ago, conjectured this to be the cause of the tides: "If," says he, "the earth ceased to attract its waters towards itself, all the water in the ocean would rise and flow into the moon: the sphere of the moon's attraction extends to our earth, and draws up the water." Thus thought Kepler, in his Introd. ad Theor. Mart. This surmise, for it was then no more, is now abundantly verified in the theory laid down by Newton, and by Halley, from his principles.

As to the Phenomena of the Tides: 1. The sea is observed to flow, for about six hours, from south towards north; the sea gradually swelling; so that, entering the mouths of rivers, it drives back the river-waters towards their heads, or springs. After a continual flux of six hours, the sea seems to rest for about a quarter of an hour; after which it begins to ebb, or retire back again, from north to south, for six hours more; in which time, the water sinking, the rivers resume their natural course. Then, after a seeming pause of a quarter of an hour, the sea again begins to flow, as before: and so on alternately.

2. Hence, the sea ebbs and flows twice a day, but falling every day gradually later and later, by about 48 minutes, the period of a flux and reflux being on an average about 12 hours 24 minutes, and the double of each 24 hours 48 minutes; which is the period of a lunar day, or the time between the moon's passing a meridian, and coming to it again. So that the sea flows as often as the moon passes the meridian, both the arch above the horizon, and that below it; and ebbs as often as she passes the horizon, both on the eastern and western side.

Other phenomena of the tides are as below; and the reasons of them will be noticed in the theory of the tides that follows.

3. The elevation towards the moon a little exceeds the opposite one. And the quantity of the ascent of the water is diminished from the equator towards the poles.

4. From the sun, every natural day, the sea is twice elevated, and twice depressed, the same as for the moon. But the solar times are much less than the lunar ones, on account of the immense distance of the sun; yet they are both subject to the same laws.

5. The tides which depend upon the actions of the sun and moon are not distinguished, but compounded, and so forming as to sense one united tide, increasing and decreasing, and thus making neap and spring tides: for, by the action of the sun, the lunar tide is only changed; which change varies every day, by reason of the inequality between the natural and lunar day.

6. In the syzygies the elevations from the action of both luminaries concur, and the sea is more elevated. But the sea ascends less in the quadratures; for where the water is elevated by the action of the moon, it is depressed by the action of the sun; and vice versa. Therefore, while the moon passes from the syzygy to the quadrature, the daily elevations are continually diminished: on the contrary, they are increased while the moon moves from the quadrature to the syzygy. At a new moon also, cæteris paribus, the elevations are greater; and those that follow one another the same day, are more different than at full moon.

7. The greatest elevations and depressions are not observed till the second or third day after the new or full moon. And if we consider the luminaries receding from the plane of the equator, we shall perceive that the agitation is diminished, and becomes less, according as the declination of the luminaries becomes greater.

8. In the syzygies, and near the equinoxes, the tides are observed to be the greatest, both luminaries being in or near the equator.

9. The actions of the sun and moon are greater the nearer those bodies are to the earth; and the less, as they are farther off. Also the greatest tides happen near the equinoxes, or rather when the sun is a little to the south of the equator, that is, a little before the vernal, and after the autumnal equinox. But yet this does not happen regularly every year, because some variation may arise from the situation of the moon's orbit, and the distance of the syzygy from the equinox.

10. All these phenomena obtain, as described, in the open sea, where the ocean is extended enough to be subject to these motions. But the particular situations of places, as to shores, capes, straits, &c. disturb these general rules. Yet it is plain, from the most common and universal observations, that the tides follow the laws above laid down.

11. The mean force of the moon to move the sea, is to that of the sun, nearly as 4½ to 1. And therefore, if the action of the sun alone produce a tide of two feet, which it has been stated to do, that of the moon will be nine feet; from which it follows, that the spring tides will be 11 feet, and the neap tides 7 feet high. But as to such elevations as far exceed these, they happen from the motion of the waters against some obstacles, and from the sea violently entering into straits or gulphs where the force is not broken till the water rises higher.

Newtonian Theory of the Tides.—1. If the earth were entirely fluid and quiescent, it is evident that its particles, by their mutual gravity towards each other, would form the whole mass into the figure of an exact sphere. Then suppose some power to act on all the particles of this sphere with an equal force, and in parallel directions; by such a power the whole mass will be moved together, but its figure will suffer no alteration by it, being still the same perfect sphere, whose centre will have the same motion as each particle.

Upon this supposition, if the motion of the earth round the common centre of gravity of the earth and moon were destroyed, and the earth left to the influence of its gravitation towards the moon, as the acting power above mentioned; then the earth would fall or move straight towards the moon, but still retaining its true spherical figure.

But the fact is, that the effects of the moon's action, as well as the action itself, on different parts of the earth, are not equal: those parts, by the general law of gravity, being most attracted that are nearest the moon, and those being least attracted that are farthest from her, while the parts that are at a middle distance are attracted by a mean degree of force: besides, all the parts are not acted on in parallel lines, but in lines directed towards the centre of the moon: on both which accounts the spherical figure of the fluid earth must suffer some change from the action of the moon. So that, in falling, as above, the nearer parts, being most attracted, would fall quickest; the farther parts, being least attracted, would fall slowest, and the fluid mass would be lengthened out, and take a kind of spheroidical form.

Hence it appears, and must be carefully observed, that it is not the action of the moon itself, but the inequalities in that action, that cause any variation from the spherical figure: and that, if this action were the same in all the particles as in the central parts, and operating in the same direction, no such change would ensue.

Let us now admit the parts of the earth to gravitate towards its centre: then, as this gravitation far exceeds the action of the moon, and much more exceeds the differences of her actions on different parts of the earth, the effect that results from the inequalities of these actions of the moon, will be only a small diminution of the gravity of those parts of the earth which it endeavoured in the former supposition to separate from its centre; that is, those parts of the earth which are nearest to the moon, and those that are farthest from her, will have their gravity toward the earth somewhat abated; to say nothing of the lateral parts. So that supposing the earth fluid, the columns from the centre to the nearest, and to the farthest parts, must rise, till by their greater height they be able to balance the other columns, whose gravity is less altered by the inequalities of the moon's action. And thus the figure of the earth must still be an oblong spheroid.

Let us next consider the earth, instead of falling toward the moon by its gravity, as projected in any direction, so as to move round the centre of gravity of the earth and moon: it is evident that in this case, the several parts of the fluid earth will still preserve their relative positions; and the figure of the earth will remain the same as if it fell freely toward the moon; that is, the earth will still assume a spheroidal form, having its longest diameter directed toward the moon.

From the above reasoning it appears, that the parts of the earth directly under the moon, as at H, plate 170, fig. 7, and also the opposite parts at D, will have the flood or high water at the same time; while the parts, at B and F, at 90° distance, or where the moon appears in the horizon, will have the ebbs or lowest waters at that time.

Hence, as the earth turns round its axis from the moon to the moon again in 24 hours 48 minutes, this oval of water must shift with it; and thus there will be two tides of flood and two of ebb in that time.

But it is further evident, that by the motion of the earth on her axis, the most elevated part of the water is carried beyond the moon in the direction of the rotation. So that the water continues to rise after it has passed directly under the moon, though the immediate action of the moon there begins to decrease, and comes not to its greatest elevation till it has got about half a quadrant farther. It continues also to descend after it has passed at 90° distance from the point below the moon, to a like distance of about half a quadrant. The greatest elevation therefore is not in the line drawn through the centres of the earth and moon, nor the lowest points where the moon appears in the horizon, but all these about half a quadrant removed eastward from these points, in the direction of the motion of rotation. Thus in open seas, where the water flows freely, the moon M is generally past the north and south meridian, as at *p*, when the high water is at Z and at *n*: the reason of which is plain, because the moon acts with the same force after she has passed the meridian, and thus adds to the libratory or waving motion, which the water acquired when she was in the meridian; and therefore the time of high water is not precisely at the time of her coming to the meridian, but some time after, &c.

Besides, the tides answer not always to the same distance of the moon, from the meridian, at the same places; but are variously affected by the action of the sun, which brings them on sooner when the moon is in her first and third quarters, and keeps them back later when she is in her second and fourth; because, in the former case, the tide raised by the sun alone would be earlier than the tide raised by the moon, and in the latter case later.

2. We have hitherto adverted only to the action of the moon in producing tides; but it is manifest that, for the same reasons, the inequality of the sun's action on different parts of the earth would produce a like effect, and a like variation from the exact spherical figure of a fluid earth. So that in reality there are two tides every natural day from the action of the sun, as there are in the lunar day from that of the moon, subject to the same laws; and the lunar tide, as we have observed, is somewhat changed by the action of the sun, and the change varies every day on account of the inequality between the natural and the lunar day. Indeed the effect of the sun in producing tides, because of his immense distance, must be considerably less than that of the moon, though the gravity toward the sun be much greater: for it is not the action of the sun or moon itself, but the inequalities in that action, that have any effect: the sun's distance is so great, that the diameter of the earth is but as a point in comparison with it, and therefore the difference between the sun's actions on the nearest and farthest parts, becomes vastly less than it would be if the sun were as near as the moon. However, the immense bulk of the sun makes the effect still sensible, even at so great a distance; and therefore, though the action of the moon has the greatest share in producing the tides, the action of the sun adds sensibly to it when they conspire together, as in the full and change of the moon, when they are nearly in the same line with the centre of the earth, and therefore unite their forces; consequently, in the syzygies, or at new and full moon, the tides are the greatest, being what are called the spring-tides. But the action of the sun diminishes the effect of the moon's action in the quarters, because the one raises the water in that case where the other depresses it; therefore the tides are the least in the quadratures, and are called neap-tides.

Newton has calculated the effects of the sun and moon respectively upon the tides, from their attractive powers. The former he finds to be to the force of gravity, as 1 to 12868200, and to the centrifugal force at the equator as 1 to 44527. The elevation of the waters by this force is considered by Newton as an effect similar to the elevation of the equatorial parts above the polar parts of the earth, arising from the centrifugal force at the equator; and as it is 44527 times less, he finds it to be 24½ inches, or 2 feet and ½ an inch.

To find the force of the moon upon the water, Newton compares the spring-tides at the mouth of the river Avon, below Bristol, with the neap-tides there, and finds the proportion as 9 to 5; whence, after several necessary corrections, he concludes that the force of the moon to that of the sun, in raising the waters of the ocean, is as 4.4815 to 1; so that the force of the moon is able of itself to produce an elevation of 9 feet 1¾ inch, and the sun and moon together may produce an elevation of about 11 feet 2 inches, when at their mean distances from the earth, or an elevation of about 12¾ feet, when the moon is nearest the earth. The height to which the water is found to rise, upon coasts of the open and deep ocean, is agreeable enough to this computation.

Dr. Horsley estimates the force of the moon to that of the sun as 5·0469 to 1, in his edit. of Newton's Princip. See the Princip. lib. 3, sect. 3, pr. 36 and 37; also Maclaurin's Dissert. de Causa Physica Fluxus et Refluxus Maris apud Phil. Nat. Princ. Math. Comment le Seur et Jacquier, tom. iii. p. 272. And other calculators make the ratio of the forces still greater.

3. It must be observed, that the spring-tides do not happen precisely at new and full moon, nor the neap-tides at the quarters, but a day or two after, because, as in other cases, so in this, the effect is not greatest or least when the immediate influence of the cause is greatest or least. As e. g. the greatest heat is not on the solstitial day, when the immediate action of the sun is greatest, but some time after.

That this may be more clearly understood, let it be considered, that though the actions of the sun and moon were to cease this moment, yet the tides would continue to have their course for some time; for the water, where it is now highest, would subside, and flow down on the parts that are lower, till, by the motion of descent, being there accumulated to too great a height, it would necessarily return again to its first place, though in a less measure, being retarded by the resistance arising from the attraction of its parts. Thus it would for some time continue in an agitation like to that in which it is at present. The waves of the sea, that continue after a storm ceases, and every motion almost of a fluid may illustrate this.

4. The different distances of the moon from the earth produce a sensible variation in the tides. When the moon approaches the earth, her action on every part increases, and the differences of that action, on which the tides depend, increase. For her action increases as the squares of the distances decrease; and though the differences of the distances themselves be equal, yet there is a greater disproportion betwixt the squares of less, than the squares of greater quantities; e. g. 3 exceeds 2 as much as 2 exceeds 1, but the square of 2 is quadruple of the square of 1, whilst the square of 3 (viz. 9) is little more than double the square of 2 (viz. 4).

Thus it appears, that, by the moon's approach, her action on the nearest parts increases more quickly than her action on the remote parts; and the tides, therefore, increase in a higher proportion as the distances of the moon decrease. Sir Isaac Newton shows, that the tides increase in proportion as the cubes of the distances decrease, so that the moon, at half her present distance, would produce a tide eight times greater.

The moon describes an ellipse about the earth, and in her nearest distance produces a tide sensibly greater than at her greatest distance from the earth: and hence it is, that two great spring-tides never succeed each other immediately; for if the moon be at her nearest distance from the earth at the change, she must be at her greatest distance at the full, having, in the intervening time, finished half a revolution; and, therefore, the spring-tide then will be much less than the tide at the change was: and for the same reason, if a great spring-tide happens at the time of full moon, the tide at the ensuing change will be less.

5. The spring-tides are greatest about the time of the equinoxes, i. e. about the latter end of March and September, and least about the time of the solstices, i. e. toward the end of June and December; and the neap-tides are least at the equinoxes and greatest at the solstices; so that the difference betwixt the spring and the neap-tides is much less considerable at the solstitial than at the equinoctial seasons. In order to illustrate and evince the truth of this observation, it is manifest, that if either the sun or moon was in the pole, they could have no effect on the tides, for their action would raise all the water at the equator to the same height; and any place of the earth, in describing its parallel to the equator, would not meet, in its course, with any part of the water more elevated than another, so that there could be no tide in any place.

The effect of the sun or moon is greatest when in the equinoctial; for then the axis of the spheroidal figure, arising from their action, moves in the greatest circle, and the water is put into the greatest agitation; and hence it is that the spring-tides produced, when the sun and moon are both in the equinoctial, are the greatest of any, and the neap-tides are the least of any, about that time.

But the tides produced when the sun is in either of the tropics, and the moon in either of her quarters, are greater than those produced when the sun is in the equinoctial, and the moon in her quarters, because, in the first case, the moon is in the equinoctial, and, in the latter case, the moon is in one of the tropics; and the tide depends more on the action of the moon than that of the sun, and is, therefore, greatest when the moon's action is greatest.

However, it is necessary to observe, 6. That, because the sun is nearer the earth in winter than in summer, the greatest spring-tides are after the autumnal, and before the vernal equinox.

7. Since the greatest of the two tides happening in every diurnal revolution of the moon is that wherein the moon is nearest the zenith, or nadir; for this reason, while the sun is in the northern signs, the greater of the two diurnal tides in our climates is that arising from the moon above the horizon; when the sun is in the southern signs, the greatest is that arising from the moon below the horizon.

In proof of this observation, let it be considered, that when the moon declines from the equator toward either pole, one of the greatest elevations of the water follows the moon, and describes nearly the parallel on the earth's surface which is under that which the moon, on account of the diurnal motion, seems to describe; and the opposite greatest elevation, being antipodal to that, must describe a parallel as far on the other side of the equator; so that while the one moves on the north side of the equator, the other moves on the south side of it, at the same distance. Now the greatest elevation which moves on the same side of the equator, with any place, will come nearer to it than the opposite elevation, which moves in a parallel on the other side of the equator; and therefore, if a place is on the same side of the equator with the moon, the day-tide, or that which is produced while the moon is above the horizon of the place, will exceed the night-tide, or that which is produced while the moon is under the horizon of the place. It is the contrary if the moon is on one side, and the place on the other side of the equator; for then the elevation which is opposite to the moon, moves on the same side of the equator with the place, and, therefore, will come nearer to it than the other elevation. This difference will be greatest when the sun and moon both describe the tropics; because the two elevations in that case describe the opposite tropics, which are the farthest from each other of any two parallel circles they can describe.

Thus it is found, by observation, that the evening tides in the summer exceed the morning tides, and the morning tides in winter exceed the evening tides. The difference is found at Bristol to amount to fifteen inches, and at Plymouth to one foot. It would be still greater, but that a fluid always retains an impressed motion for some time; so that the preceding tides affect always those that follow them. Upon the whole, while the moon has north declination, the greatest tides in the northern hemisphere are when she is above the horizon, and the reverse while her declination is south.

Such are the general principles on which these interesting phenomena depend, as they are exhibited in Chambers's, Hutton's, and other dictionaries. But it may be expedient to touch upon a few of the more particular appearances. Now, it is evident, that to allow the tides their full motion, the ocean in which they are produced ought to be extended from east to west 90 degrees at least; because that is the distance between the places where the water is most raised and depressed by the moon. Hence it appears that it is only in the great oceans that such tides can be produced, and why in the larger Pacific ocean they exceed those in the Atlantic ocean. Hence also it is obvious, why the tides are not so great in the torrid zone, between Africa and America, where the ocean is narrower, as in the temperate zones on either side; and hence we may also understand why the tides are so small in islands that are very far distant from the shores. It is farther manifest that, in the Atlantic ocean, the water cannot rise on one shore but by descending on the other; so that at the intermediate islands it must continue at a mean height between its elevations on those two shores. But when tides pass over shoals, and through straits into bays of the sea, their motion becomes more various, and their height depends on many circumstances.

To be more particular. The tide that is produced on the western coasts of Europe, in the Atlantic, corresponds to the situation of the moon already described. Thus it is high water on the western coasts of Ireland, Portugal, and Spain, about the third hour after the moon has passed the meridian: from thence it flows into the adjacent channels, as it finds the easiest passage. One current from it, for instance, runs up by the south of England, and another comes in by the north of Scotland; they take a considerable time to move all this way, making always high water sooner in the places to which they first come; and it begins to fall at these places while the currents are still going on to others that are farther distant in their course. As they return, they are not able to raise the tide, because the water runs faster off than it returns, till, by a new tide propagated from the open ocean, the return of the current is stopped, and the water begins to rise again. The tide propagated by the moon in the German ocean, when she is three hours past the meridian, takes twelve hours to come from thence to London bridge; so that when it is high water there, a new tide is already come to its height in the ocean; and in some intermediate place it must be low water at the same time. Consequently when the moon has north declination, and we should expect the tide at London to be the greatest when the moon is above the horizon, we find it is least; and the contrary when she has south declination.

At several places it is high water three hours before the moon comes to the meridian; but that tide, which the moon pushes as it were before her, is only the tide opposite to that which was raised by her when she was nine hours past the opposite meridian.

It would be endless to recount all the particular solutions, which are easy consequences from this doctrine: as, why the lakes and seas, such as the Caspian sea and the Mediterranean sea, the Black sea and the Baltic, have little or no sensible tides: for lakes are usually so small, that when the moon is vertical she attracts every part of them alike, so that no part of the water can be raised higher than another: and having no communication with the ocean, it can neither increase nor diminish their water, to make it rise and fall; and seas that communicate by such narrow inlets, and are of so immense an extent, cannot speedily receive and empty water enough to raise or sink their surface any thing sensibly.

Such are the principal consequences deducible from the Newtonian theory; and, considering the state of science at the time in which it was produced, it was certainly a most wonderful effort of human genius. A more intimate acquaintance, however, with the solar system, and a more complete developement of the effects of motion and attraction discovered by Newton, have enabled subsequent philosophers, as Maclaurin, Euler, D'Alembert, Laplace, &c. gradually to extend and perfect the theory so admirably struck out by the great British philosopher. Laplace especially, in Mem. de l'Academie Par. for 1775, 1789, and 1790, and more fully in the Mécanique Céleste, has treated this subject more completely than any of his predecessors in the same region of enquiry. We are persuaded that the following popular view of his labours will be very acceptable to our philosophical readers.

After having established the conditions of equilibrium for a point acted upon by any given number of forces in any given directions, M. Laplace considers the conditions of the equilibrium of fluids; the property which characterises them being perfect mobility, it follows of course, that for a fluid mass to become in equilibrium, it is necessary that each of the molecules that compose it be in equilibrium by virtue of the forces that influence it. From this principle, therefore, he determines the relation that should subsist between the forces acting on the system, in order to the fulfilment of this condition; and he applies it to the equilibrium of a homogeneous fluid mass surrounding a solid nucleus, fixed, and of any given figure.

He afterwards introduces into his differential equations the forces which disturb the state of equilibrium. These forces are, first, the attraction of the sun and moon; second, the attraction of the aqueous bed, of which the interior radius is that of the spheroid in equilibrium, and the exterior radius that of the perturbed spheroid.

Proceeding first upon the supposition of the earth being spherical without any rotary motion, and the depth of the sea every where the same, he seeks for the oscillations that in such a case would be excited by the united action of the sun and moon.

The integration of the differential equations presenting many difficulties, the author limits himself to a case of great extent, which is the supposition that the depth of the sea is only a function of the latitude. In this case even the investigation of the radius of the spheroid conducts to a linear differential equation, of which the integration surpasses the force of analysis; but the author observes, that in order to determine the oscillations of the ocean, it is not necessary to integrate this equation generally, and that it is sufficiently satisfactory, because the parts of these oscillations, depending on the primitive state of the sea, would soon have disappeared, from the effect of the exterior obstacles; so that without the action of the sun and moon, the sea would long since have arrived at a state of permanent equilibrium; whence it follows, that the action of these two luminaries agitates it incessantly, and that it is sufficient to consider thus the oscillations which depend on such action.

As he proceeds to develope the terms that produce them, M. Laplace divides them into three classes; the first not at all depending on the rotary motion of the earth, but solely on the motion of the attracting body in its orbit; they vary very slowly, and do not become the same again until after a long interval. The terms of the second class depend principally on the rotary motion of the earth, and become the same again after an interval of nearly a day; lastly, those of the third class depend on a double angle, and consequently return in like manner after half a day. Hence result three different kinds of oscillations, the periods of which are the same as those of the terms that produce them; the increase of the radius of the spheroid being given by a linear equation, these oscillations are superposed without being confounded, which permits the author to consider them separately.

He proceeds to examine the first, supposing the earth to be a revolving ellipsoid, which renders the depth of the sea a function of the latitude only; and he demonstrates, that if the attracting luminary be at a sufficient distance, these oscillations may be calculated as if the depth of the sea were nearly the same in every part; the portion of these oscillations which depends on the motion of the nodes of the lunar orbit, may be very considerable; but the author demonstrates that these great oscillations are almost entirely annihilated by the resistance that the sea meets with in its motion, and that they are very nearly the same as if the sea were placed at each instant in equilibrium under the luminary that attracts it: this result becomes the more exact, as the attracting luminary moves more slowly in its orbit; the error is consequently insensible with respect to the sun, and the observations indicating that the oscillations of this class are very small, the same consideration may be applied to the moon, notwithstanding the rapidity of her motion.

M. Laplace next proceeds to develope the terms produced by the second species of oscillations, which depend principally on the rotary motion of the earth.

This observation is here very important, and becomes even indispensable to enable us to deduce from these terms a law of the depth of the sea. It affords the means of expressing in a very simple way the oscillations of this species, when the spheroid is a revolving one. From these oscillations proceed the difference of the tide in one and the same day. This difference is very small, as the observations indicate; whereas in the ordinary hypothesis, the difference would be very great: it is necessary, therefore, that the depth of the sea be nearly constant. The author determines, on this hypothesis, the oscillations that he has examined.

He calculates, on the same supposition, the oscillations of the third species; observing afterwards that the resistance which the sea experiences in its movements renders those of the first species independent of the law of its depth, he concludes that it is only necessary to consider those laws of the depth of the sea by which we may determine at once the oscillations of the second and third species; which reduces it to the supposition, that the depth of the sea is nearly uniform. He gives, in this hypothesis, the numerical expression of the oscillations, and of the flux and reflux of the sea according to various suppositions with regard to depth.

Having thus determined the oscillations of the sea, by supposing the earth to be a spheroid of revolution, the author approaches nearer to nature by giving the earth any form whatever, and he establishes the equations of the motions of the sea, whatever be the law of its depth.

In this case the oscillations of the first order, almost annihilated by the resistance the sea experiences, will be the same as before.

With respect to the other oscillations, he proposes to determine the laws of the depth of the sea, in which they may become nothing all over the earth; to accomplish this he equals to zero the variation that they introduce in the radius of the spheroid; he deduces from it, first, that the oscillations of the second order cannot disappear all over the earth, except in the case where the depth of the sea is every where the same.

Secondly, That the disappearance of the oscillations of the third order would suppose the depth of the sea to be infinite at the equator, and nothing at the poles; so that there is no admissible law that can annihilate them entirely. The author afterwards, by applying to the general hypothesis of an indeterminate depth, the analysis that he employs when the enveloped spheroid is one of revolution, obtains the approximate expression of the height to which the action of the sun and moon raise the molecules of the sea above its surface of equilibrium, and this formula, which is much more general than the preceding, embraces also a great many phenomena which nature presents to us, and which escape notice in the case where the depth of the sea is merely a function of the latitude. Such is the difference between the hour of the tide and the passage of the body which produces it over the meridian; a difference which may and ought to be variable at different ports. But notwithstanding its generality, the preceding formula is still insufficient for all observations; and it is not astonishing, when we consider the irregularity of the borders of the ocean, and the variety of resistances that it experiences; causes which it is impossible to reduce to calculation, and which obviously modify the oscillations of this mass of fluid. Hence the author concludes, that he must limit himself to the analysis of the general phenomena resulting from the attraction of the sun and moon, and to deducing from his observations on them, the data which are indispensable to complete, in every port, the theory of the flux and reflux of the sea.

In consequence, he takes the estimate previously obtained of the forces that give motion to the molecules of the sea, and he decomposes them into three other forces; the first directed according to the terrestrial radius; the second perpendicular to this radius and the plane of the meridian; the third perpendicular to that plane. Considering afterwards the action of the sun, as supposed to move uniformly in the plane of the equator, and always at the same distance from the centre of the earth, he observes that the forces resulting from this attraction are composed of two parts; one independent of time, and invariable with regard to the molecules situated in the same latitude; the other depending on the motion of the earth and the position of the luminary in its orbit; and as the constant parts of these forces must necessarily occasion a little alteration in the permanent figure which the sea assumes in consequence of the rotary motion of the earth, the author confines himself to the consideration of the variable parts which cause the oscillations of the fluid. He then establishes this general principle, that the state of a system of bodies, in which the initial conditions of motion have disappeared in consequence of the resistance opposed to them, is periodical, as well as the forces that actuate them; and as the variable forces of which we have been speaking return to the same state in half a day, he concludes that there must be a flux and reflux in this interval.

Thus if we suppose a curve of which the abcissas represent the time, and the ordinates the corresponding elevations of the sea, the part of the curve corresponding to the abcissa, which represents half a day, will determine the entire curve, which will be the indefinite repetition of that first part.

To determine this curve, we must suppose a second sun, perfectly similar to the first, and moving in the same manner in the plane of the equator, with this single difference, that it precedes the first sun by a certain angle. After having estimated the forces resulting from the action of this second sun, we must suppose a third, of which we determine the mass and the position, and which would alone produce the same effect as the two others, and if all other circumstances are the same, and the elevation of the sea should be proportional to the mass of the bodies that produce it, we easily obtain the elevation corresponding to the third sun in functions of the height that the first sun would produce in the same position; but from the nature of the infinitely small oscillations that are superposed without being confounded, the elevation of the sea, caused by the action of the two first suns, is equal to the sum of the elevations that each would produce separately; making this sum equal to that which the hypothesis of the third sun gives, there results a linear equation of finite differences between three ordinates of the curve of elevations of the sea. The author fulfils the conditions of this equation by the theorem of Dr. Brook Taylor, which serves to develope a function according to the powers of the variable, by means of differentials of different orders (see Taylor's theorem), and thence deduces the expression of the height of the sea, which he constructs very elegantly. This expression includes two arbitrary quantities, of which the first depends on the magnitude of the full tide in the port under consideration, and the second on the hour of such high tide, or on the time in which it follows the passage of the sun over the meridian.

It appears at first sight that the hour of the tide ought to coincide with the passage over the meridian of the body that produces it, and that it would in fact take place if the earth were a revolving spheroid: but this is not the case in reality. To perceive the reason of this, it must be observed, that the phenomena of the tides are very sensible in a large mass of fluid, because the impression that each molecule receives is communicated to the whole mass, and must be scarcely sensible in lakes and small seas, such as the Caspian and Black seas. If therefore we suppose a large canal communicating with the sea and advancing very far into the lands situated under the meridian of its mouth, the flux and reflux belonging to this canal would be insensible at those places, but not so at the mouth itself; and the undulations produced at this extremity being successively continued to the whole length of the canal, would form at each of its points a flux and reflux subject to the same laws, but reaching them at later hours in proportion to their distance from the mouth.

M. Laplace then considers the action of the moon, supposing it to move uniformly in the plane of the equator, and always at the same distance from the centre of the earth; it is evident that a flux and reflux must result from it similar to that produced by the sun: he estimates it in the same manner, and combines the two oscillations, which being very small, by reason of the terrestrial radius, are superposed without being confounded; and he thence deduces the expression of the total elevation of the tide, which, according to what has been said above, includes four arbitrary constant quantities. This elevation is the greatest, when the two lunar and solar tides coincide; and it is least, when the high tide of the body that produces the greatest effect coincides with the low tide of the other. If then the solar tide exceeded the lunar tide, the maximum and the minimum would take place at the same hour of the day: in the contrary case the least tide would take place at the instant of the low solar tide, and would consequently be a quarter of a day later than the great tide. This furnishes the author with a simple method of ascertaining whether the lunar or solar action is the greatest; and all the observations prove that it is the former.

If we suppose, as before, a large canal communicating with the sea, it is obvious that it must take a certain length of time for the oscillations that take place at its mouth to make their way to its extremity; and as this time will approach more or less an equality to an exact number of lunar or solar days, the lunar or solar tides at this extremity will approximate also more or less to the hour in which the bodies that produce them arrive at the meridian. Hence we see how necessary it is in the theory of the tides to attend to the local circumstances of the port; and the consideration of the curve of the elevations of the sea, by introducing arbitrary quantities dependent on these circumstances, forms a very simple method of doing this. Laplace also shows that it is equally necessary to attend to them, in order to determine, by the phenomena of the tides, the attractive forces of the sun and moon. He then applies these formulæ to a case in which he supposes the above-mentioned canal to have two mouths, so situated that it shall be high water at the first at the same time that it is low water at the second, and reciprocally; and he demonstrates that if the two tides reach the extremity of the canal at the same time, there will be no flux and reflux at this extremity by reason of the oscillations whose period is half a day. This singular case, which depends entirely on local circumstances, has been observed at Batsha, a port in the kingdom of Tonquin, and in some other places.

The author then considers the case in which the sun and moon, always moving in the plane of the equator, would be subject to inequalities in their motions and in their distances; and lastly, he passes to the case actually occurring in nature, in which we must pay attention to the declination of these luminaries. He shows that this general case may, as well as the preceding, be applied to that of several other bodies moving uniformly in the plane of the equator, but at different distances from the centre of the earth, and with different velocities in their orbits. Combining these partial actions, he concludes, that in the system of nature in which these luminaries move in orbits inclined to the equator, the elevation of the tide is owing to the attraction both of the moon and sun.

This expression occasions two sorts of phenomena, one relative to the height of the tides, the other relative to their intervals. In order to compare them with the observations, the author considers them at their maximum towards their syzygies; and at their minimum towards the quadratures. The observations that he employed were collected from those that were made at Brest, on the invitation of the Academy of Sciences, for six successive years, and which M. Lalande has published in his Treatise of Astronomy. M. Laplace examined with the utmost care all those that he employed.

Among the phenomena that the system of the universe afford us, there are few of more importance than the flux and reflux of the sea; an accurate acquaintance with it is not only serviceable to the daily business of sea-ports, but it is also useful to prevent the accidents that might result from the inundations of the high tides towards the syzigies. This result of the celestial attraction has, besides, the advantage of serving to confirm in the most positive manner, the theory of universal gravity, which the author is particularly careful to establish, by recurring with much ability to the striking coincidence of the observations with the theory. The result of this comparison is, that at Brest the influence of the moon on the phenomena of the tides is nearly treble that of the sun. This theory is one of the most interesting in his great work the Mécanique Céleste; we there find every thing that is necessary to be applied to practice at different ports, the phenomena that it concerns us to follow, and whose elements are still dubious; lastly, it would be difficult to find a more excellent model of that important art, which consists in examining the phenomena, and extricating by skilful combinations and expedients those we are desirous of examining. We have spoken thus on this work, in order to show, both the difficulties the author has surmounted, and the importance of his theory which is as new as it is difficult.

M. Laplace has been also desirous of determining whether the sea can have any influence on the motion of the earth, on account of the aqueous bed, which, through the attraction of the sun and moon, is deposited on the surface of equilibrium of the sea. He estimates these forces, substitutes them in the equations of solid bodies, investigates them, and demonstrates that they are the same as if the sea formed a solid mass with the spheroid that it surrounds.

The preceding analysis, although very general, supposes that the sea entirely covers the terrestrial spheroid, that its depth is uniform, and that it experiences no resistance from the spheroid that it encloses. These suppositions might cause a doubt that the preceding results actually take place in nature. The author, therefore, gives a second demonstration independent of these hypotheses.

The principle of areas, which the author has often employed, has here the advantage of being equally true, when the system experiences any changes or sudden movements, as is often the case with the sea when it happens to break against rivers. If the body be subject to the action of foreign forces, the sum of the areas described during the element of time is no longer a constant quantity, but it is easy to obtain its variation, which is independent of the mutual connexion of the parts of the system. This being admitted, we may suppose a mass, partly fluid and partly solid, to be deranged from the state of equilibrium by the action of very small forces, which leave the centre of gravity at rest; the sum of the areas described during the element of time will be (nearly to quantities of the second order) the same as if the mass had been entirely solid. Hence it follows, that after any time whatever the amount of the areas will still be the same on the two hypotheses.

This being admitted, considering the earth as a revolving spheroid, very little different from a sphere, and surrounded by a fluid of little depth, the author estimates the sum of the areas in the two cases above-mentioned; and on equating these sums, he infers that the motion of the earth round its centre of gravity is the same as it would be if the sea formed with it one solid mass. He then extends this demonstration to the case in which he supposes the earth to be of any given form.

After having established this excellent theorem, M. Laplace proceeds to examine whether the trade winds which constantly blow from west to east between the tropics, do not alter the rotary motion of the earth by striking against the continents and mountains they meet with; but the principle of areas soon shows that these winds, which are produced by the solar heat, cannot have such an effect; as this heat dilating the body equally on every side, the amount of the areas is not altered; so that while the trade-winds at the equator diminish the rotary motion of the earth, the other motions of the atmosphere, which take place beyond the tropics by virtue of the same cause, accelerate the motion in the same proportion. The author applies this reasoning to earthquakes, torrents, and generally to whatever is likely to agitate the earth in its interior and at its surface; and he concludes that these causes do not at all disturb the rotary motion of the earth, which can only be altered by the displacing of its parts; but this effect, to be sensible, would argue great changes in its internal constitution.

The invariability of the rotary motion of the earth is of the greatest importance; since the length of the days depend on it. This theorem and the author's previous researches, in which he determines the effect of the re-action of the waters of the sea on the axis of the earth, are very proper to show the extent and power of analysis, and the degree to which it has been carried in the eighteenth century.

Tide dial, an instrument contrived by Mr. Ferguson, for exhibiting and determining the state of the tides. For the construction and use of which, see his Astron. p. 297.

TI'DEGATE. *s.* (*tide* and *gate.*) A gate through which the tide passes into a basin.

TI'DESMAN. *s.* (*tide* and *man*) A tide-waiter or customhouse officer, who watches on board of merchant-ships till the duty of goods be paid (*Bailey*).

TIDE TABLES, are tables commonly exhibiting the times of high water at sundry places, as they fall on the days of the full and change of the moon, and sometimes the height of them also. These are common in most books on navigation, particularly Robertson's, and the third edition of Tables requisite to be used with the Nautical Almanac.

TI'DEWAITER. *s.* (*tide* and *wait.*) An officer who watches the landing of goods at the customhouse (*Swift*).

TI'DILY. *ad.* (from *tidy.*) Neatly; readily.

TI'DINESS. *s.* (from *tidy.*) Neatness; readiness.

TI'DINGS. *s.* (ꞇıꝺan, Saxon, *to happen.*) News; an account of something that has happened; incidents related (*Rogers*).

TI'DY. *a.* (*tidt*, Islandic.) 1. Seasonable (*Tusser*). 2. Neat; ready (*Gay*).

To TIE. *v. a.* (ꞇıan, ꞇıᵹan, Saxon.) 1. To bind; to fasten with a knot (*Knolles*). 2. To knit; to complicate (*Burnet*). 3. To hold; to fasten; to join so as not easily to be parted (*Fairfax*). 4. To hinder; to obstruct (*Waller*). 5. To oblige; to constrain; to restrain; to confine (*Hooker*).

Tie. *s.* (from the verb.) 1. Knot; fastening. 2. Bond; obligation (*Waller*).

TIER. *s.* (*tiere*, *tieire*, old French; *tuyer*, Dutch.) A row; a rank (*Knolles*).

TIERCE, or Teirce, a liquid measure, as of wine, oil, &c. containing 42 gallons, or the third part of a pipe; whence its name.

Tierce. In music. The interval of a third. See Third.

Tierce of Picardy. The name formerly given in France to the major-third, introduced instead of the minor, in the concluding chord of a composition in the minor-mode. The major-mode being considered as more harmonious than the minor, it was a law to finish on the first: but a more polished taste has discarded that Gothic fashion; and we now conclude with the third proper to the mode in which the composition is written.

The major-third, as formerly adopted, was called the tierce of Picardy, because the use of this final chord continued longest in church music, and consequently in Picardy, where they had music in a great number of cathedrals, and other churches.

TI'ERCET. *s.* (from *tiers*, French.) A triplet; three lines.

TIFF. *s.* (A low word.) 1. Liquor; drink (*Philips*). 2. A fit of peevishness or sullenness; a pet.

To Tiff. *v. n.* To be in a pet; to quarrel.

TI'FFANY. *s.* (*tiffer*, to dress up; old French.) Very thin silk (*Brown*).

TIGE. *s.* (In architecture.) The shaft of a column from the astragal to the capital (*Bailey*).

TIGELLIUS, a native of Sardinia, who became the favourite of J. Cæsar, of Cleopatra, and Augustus, by his mimicry and facetiousness. He was celebrated for the melody of his voice.

TIGER, in mastiology. See Felis.

Tiger-stone, in mineralogy, a species of sandstone. See Sandstone.

TIGHT. *a.* (*dicht*, Dutch.) 1. Tense; close; not loose (*Moxon*). 2. Free from fluttering rags; less than neat (*Swift*).

To TI'GHTEN. *v. a.* (from *tight.*) To straiten; to make close.

TI'GHTER. *s.* (from *tighter.*) A ribband or string by which women straiten their clothes.

TI'GHTLY. *ad.* (from *tight.*) 1. Closely; not loosely. 2. Neatly; not idly (*Dryden*).

TI'GHTNESS. *s.* (from *tight.*) 1. Closeness; not looseness (*Woodward*). 2. Neatness.

TIGLIA GRANA. Grana tilli. Grana tiglii. The grana tilia are seeds of a dark grey colour, the produce of croton tylium of Linnéus, in shape very like the seed of the ricinus communis. They abound with an oil which is far more acrid and purgative than castor oil.

TIGRANES, a king of Armenia, who made himself master of Assyria and Cappadocia. He married Cleopatra, the daughter of Mithridates, and, by the advice of his father-in-law, declared war against the Romans. He was defeated by the Roman consul Lucullus, near mount Taurus. His mean submission afterwards to Pompey, the successor of Lucullus, in Asia, insured him on his throne, and he received a garrison in his capital, and continued at peace with the Romans. His second son of the same name attempted to dethrone him, but was afterwards sent in chains to Rome for his insolence to Pompey.

TIGRESS, a female tiger.

TIGRIS, a river of Turkey in Asia, which has its source in the mountain of Tchilder, in Diarbek. It flows by Diarbekir, Gezira, Mosul, and Tecrit, in which course it separates Diarbek from Curdistan; then enters Irac Arabi, where it passes by Bagdad and Corna, and soon after joins the Euphrates, 35 miles above Bassora.

TIKE. *s.* (*tik*, Swedish; *teke*, Dutch.) 1. The louse of dogs or sheep; a tick. (See Acarus.) 2. It is in *Shakspeare* the name of a dog, (from *tijk*, Runic, a little dog.)

TILBURY (East), a village in Essex, near the mouth of the Thames, E. of Tilbury Fort. In this parish is a field, called Cave Field, in which is a horizontal passage to one of the spacious caverns in the neighbouring parish of Chadwell. Dr. Derham measured three of the most considerable of them, and found the depth of one to be 50, another 70, and the third 80 feet. Their origin is too remote for investigation.

Tilbury (West), a village in Essex, to the N. of Tilbury Fort. In 630, it was the see of bishop Cedda, or St. Chad, who converted the East Saxons. When the Spanish armada was in the English channel, in 1588, queen Elizabeth had a camp here, and some traces of it are visible. In 1727, a medicinal spring was discovered near this village.

Tilbury fort, a fortress in Essex, situate on the Thames, opposite Gravesend. It has a double moat, the innermost of which is 180 feet broad; and its chief strength on the land side consists in its being able to lay the whole level under water. On the side next the river is a strong curtain, with a platform before it; on both which, and the bastions, are planted a great number of guns. It is 28 miles E. by S. of London.

TILE. *s.* ꞇiᵹle, Saxon; *tegel*, Dutch; *tuile*, French.) Thin plates of baked clay used to cover houses (*Moxon*).

To Tile. *v. a.* (from the noun.) 1. To cover with tiles (*Bacon*). 2. To cover as tiles.

TI'LER. *s.* (*tuilier*, French, from *tile.*) One whose trade is to cover houses with tiles (*Bacon*).

TILIA. Lime-tree. Linden-tree. In botany, a genus of the class polyandria, order monogynia. Calyx five-parted; petals five; capsule superior, coriaceous, obovate, angular, five-celled, five-valved, opening at the base. Four species, as follow:

1. T. Europæa. European lime-tree. Flowers without a nectary; leaves heart-shaped, with the ramifications of their veins woolly underneath. A native of Europe, and generally believed to be so of Britain. The wood is light, smooth, and of a spongy texture, in use for making lasts and tables for shoemakers. Ropes and bandages are manufactured from the bark; and mats and rustic garments of the inner rind in Carniola, and some other countries.

2. T. Americana. Broad-leaved American lime-tree.

3. T. pubescens. Pubescent Carolina lime-tree.

4. T. alba. White lime-tree, a native of Hungary; the leaves white, downy underneath, deeply heart-shaped, slightly sinuate.

The flowers of the first are supposed to possess anodyne and antispasmodic virtues. They have a moderately strong smell, in which their virtue seems to consist, and abound with a strong mucilage. They are in high esteem in France.

TI'LING. *s.* (from *tile.*) The roof covered with tiles (*Luke*).

TILL. *s.* A money box in a shop (*Swift*).

Till. *prep.* (ꞇil, Saxon.) 1. To the time of (*Cowley*). 2. Till *now.* To the present time (*Milton*). 3. Till *then.* To that time.

To Till. *v. a.* (ꞇẏlian, Saxon; *tenlen*, Dutch.) To cultivate; to husband; commonly used of the husbandry of the plough (*Milton*).

TI'LLAGE. *s.* (from *till.*) Husbandry; the act or practice of ploughing or culture (*Bacon*).

TILLANDSIA. In botany, a genus of the class hexandria, order monogynia. Calyx three-cleft, permanent: corol three-cleft, campanulate; capsule one-celled; seeds inverted, with long hairs. Sixteen species; natives of the West Indies or America.

TI'LLER. *s.* (from *till.*) 1. Husbandman; ploughman (*Carew*). 2. The rudder of a boat. 3. A till; a small drawer (*Dryden*).

TILLII GRANA. See Tiglia grana.

TILLÆA, in botany, a genus of the class tetrandria, order tetragynia. Calyx from three to five-cleft; petals from three to five; capsules from three to five, many seeded, opening inwardly. Eight species; natives of Europe or of the Cape: one common to our own country, tillæa muscosa; stem procumbent: found wild on our dry heaths.

TILLOTSON (Dr. John), archbishop of Canterbury, was the son of a clothier at Sowerby, in Yorkshire, and born in 1630. He received his education at Clare-hall, Cambridge, where he was chosen fellow in 1651. Though he was bred among the puritans, he cheerfully conformed at the restoration to the church of England, and became curate of Cheshunt, in Hertfordshire. In 1663 he became preacher to the society of Lincoln's-inn, and the year after, lecturer of St. Lawrence Jewry. He was soon followed as a popular preacher, and in 1666 took his degree of D. D. In 1670 he was made prebendary of Canterbury, and in 1672, dean of that church. He distinguished himself by his zeal against the progress of popery, both in his preaching and from the press. He attended lord Russell; and it is remarkable that he urged upon him, as also did Dr. Burnet, the doctrine of non-resistance; a principle which they both saw reason to renounce afterwards. At the revolution he was taken into the entire confidence of king William and queen Mary; and when Sancroft was suspended, the metropolitical seat was conferred on him, much against his inclination. He was violently assailed with abuse by the non-juring party, to all of which he paid little attention; and when some of the libellers were taken up, he laboured to get them discharged. After his death a bundle of papers was found in his study, with this inscription upon them, "These are libels; I pray God forgive them, I do."

This excellent prelate died in 1699, and his funeral sermon was preached by bishop Burnet. His works are universally known, and we think we may safely add, as universally admired.

TILLUS, in the entomology of Fabricius, a tribe of the genus Hispa, which see.

TI'LLYFALLY. Ti'llyvalley. *ad.* A word used formerly when any thing said was rejected as trifling or impertinent (*Shaksp.*).

TI'LMAN. *s.* (*till* and *man.*) One who tills; a husbandman (*Tusser*).

TILMUS, (τιλμος, from τιλλω, to pluck.) The fumbling about the bed-clothes, as though from a desire to gather or pluck something, observable in the last stages of low fevers. Vellication.

TILSIT, a town of Prussia, in the Lithuanian department, with a castle. It has a considerable trade in corn, linseed, butter, cheese, and other provisions. In 1757, it was taken by the Russians, but soon abandoned. In 1807, it was taken by the French; soon after which two treaties of peace were made, between France and Prussia, and France and Russia, the three sovereigns being here in person. It is situate on the Memel, 50 miles N.E. of Konigsberg, and 95 S.S.W. of Mittau. Lon. 22. 8 E. Lat. 55. 8 N.

TILT. *s.* (ꞇylð, Saxon.) 1. A tent; any support of covering over head (*Denham*). 2. The cover of a boat (*Gay*). 3. A military game, at which the combatants run against each other with lances on horseback (*Prior*). 4. A thrust (*Addison*).

To Tilt. *v. a.* (from the noun.) 1. To cover like a tilt of a boat. 2. To carry or point as in tilts (*Philips*). 3. (*tillen*, Dutch.) To turn up so as to run out: as, the barrel is *tilted.*

To Tilt. *v. n.* 1. To run in tilts or tournaments (*Milton*). 2. To fight with rapiers (*Shakspeare*). 3. To rush as in combat (*Collier*). 4. To play unsteadily (*Pope*). 5. To fall on one side (*Grew*).

TI'LTER. *s.* (from *tilt.*) One who tilts; one who fights (*Glanville*).

TILTH. *s.* (from *till.*) Husbandry; culture (*Shakspeare*).

Tilth. *a.* (from *till.*) Arable; tilled (*Milton*).

TIMAC. The name of a root imported from the East Indies, which is said to possess diuretic virtues, and therefore exhibited in dropsies. It is not known from what plant it is obtained.

TIMANTHES, a painter of Sicyon, in the reign of Philip, the father of Alexander the Great. His painting of Iphigenia going to be immolated was greatly admired. He obtained a prize, for which the celebrated Parrhasius was a competitor. This was in painting an Ajax with all the fury which his disappointment could occasion, when deprived of the arms of Achilles.

TI'MBER. *s.* (ꞇimbꞃian, Saxon, *to build.*) 1. Wood fit for building (*Woodward*). 2. The main trunk of a tree (*Shakspeare*). 3. The main beams of a fabric. 4. Materials, ironically (*Bacon*).

To Ti'mber. *v. n.* (from the noun.) To light on a tree. A cant word (*L'Estrange*).

To Ti'mber. *v. a.* To furnish with beams or timber.

TI'MBERED. *a.* (from *timber*; *timbrè*, French.) Built; formed; contrived (*Brown*).

TI'MBERSOW. *s.* A worm in wood; perhaps the woodlouse (*Bacon*).

TI'MBREL. *s.* (*timbre*, French.) A musical instrument played by pulsation (*Sandys*).

TIME. *s.* (ꞇima, Saxon; *tym*, Erse.) 1. The measure of duration (*Locke*). 2. Space of time (*Swift*). 3. Interval (*Bacon*). 4. Life considered as employed, or destined to employment (*Law*). 5. Season; proper time (*Ecclus*). 6. A considerable space of duration; continuance; process of time (*Woodward*). 7. Age; part of duration distinct from other parts (*Dryden*). 8. Past time (*Shakspeare*). 9. Early time (*Rogers*). 10. Time considered as affording opportunity (*Clarendon*). 11. Particular quality of some part of duration (*South*). 12. Particular time (*Addison*). 13. Hour of childbirth (*Clarendon*). 14. Repetition of any thing, or mention with reference to repetition (*Swift*). 15. Musical measure (*Shakspeare*).

To Time. *v. a.* (from the noun.) 1. To adapt to the time; to bring or do at a proper time (*L'Estrange*). 2. To regulate as to time (*Addison*). 3. To measure harmonically (*Shakspeare*).

Time, a succession of phenomena in the universe; or a mode of duration, marked by certain periods or measures, chiefly by the motion and revolution of the sun. The idea of time, in the general, Mr. Locke observes, we acquire by considering any part of infinite duration as set out by periodical measures: the idea of any particular time, or length of duration, as a day, an hour, &c. we acquire first, by observing certain appearances at regular, and, seemingly, at equidistant periods. Now, by being able to repeat those lengths or measures of time as often as we will, we can imagine duration where nothing really endures or exists; and thus we imagine to-morrow, next year, &c. Some of the latter school-philosophers define time to be the duration of a thing whose existence is neither without beginning nor end: by which time is distinguished from eternity. Time is distinguished into absolute and relative. Absolute time, is time considered in itself, and without any relation to bodies, or their motions. This flows equally, *i. e.* never proceeds faster or slower, but glides on in a constant, equable tenor. Relative time, is the sensible measure of any duration, by means of motion. For, since that equable flux of time does not affect our senses, nor is any way immediately cognizable thereby, there is a necessity for calling in the help of some nearly equable motion to a sensible measure, whereby we may determine its quantity by the correspondency of the parts of this with those of that. Hence, as we judge those times to be equal which pass, while a moving body, proceeding with an equable velocity, passes over equal spaces; so we judge those times to be equal which flow while the sun, moon, and other luminaries, perform their revolutions, which, to our senses, are equal. But since the flux of time cannot be accelerated nor retarded, whereas all bodies move sometimes faster and sometimes slower, and there is, perhaps, no perfectly equable motion in all nature; it appears, hence, to follow, that absolute time should be something truly and really distinct from motion. For let us suppose the heavens and the stars to have remained without motion from the very creation: does it hence follow, that the course of time would have been at a stand? or rather, would not the duration of that quiescent state have been equal to the very time now elapsed?

Since absolute time is a quantity uniformly extended, and, in its own nature, most simple, it hence comes to be represented by mathematicians, to the imagination, under the most simple, sensible magnitudes, and particularly right lines and circles, with which it bears a near analogy, in respect of its genesis, similarity, &c.

It is not indeed necessary, that time should be measured by motion; any constant periodical appearance in seemingly equidistant spaces, as the freezing of water, the blowing of a plant, &c. returning at set periods, might do as well. In effect, Mr. Locke mentions an American people, who count their years by the coming and going away of birds.

Some authors distinguish time into *astronomical* and *civil*.

TIME (Astronomical), is that taken purely from the motion of the heavenly bodies, without any other regard.

TIME (Civil), is the former time accommodated to civil uses, and formed and distinguished into years, months, days, &c.

Time makes the subject of chronology.

TIME, in the manage, is sometimes taken for the motion of a horse that observes measure and justness in performing a manage; and sometimes it signifies the interval between two of his motions. In the manage of a step and a leap, the horse makes by turns a corvet between two caprioles; and in that case the corvet is one time that prepares the horse for the caprioles. The times observed in making a stop, are nothing but so many falcades.

TIME, in music, is an affection of sound, by which we denominate it long or short, with regard to its continuance.

Common, or double time, is of two species. 1. When every bar or measure is equal to a semibreve, or its value in any combination of notes of a lesser quantity. 2. When every bar is equal to a minim, or its value in lesser notes. The movements of this kind of measure are various, but there are three common distinctions; the first slow, signified by the mark C; the second brisk, signified by 𝄵; the third very quick, signified by Ↄ̸.

The old musicians were acquainted with no more than two sorts of time: one of three measures in a bar, which they called perfect; and the other of two, considered as imperfect.

When the time was perfect, the breve was equal to three semibreves, which was expressed by an entire circle, barred or not barred, and sometimes also by this compound character $^{3}_{1}$. When the time was imperfect, the breve was equal only to two semibreves, which was indicated by a semicircle, or C. Sometimes the C was reversed, as thus Ↄ, which signified a diminution, by one-half, of the powers of the notes; a particularity sometimes denoted in the more modern music, by a perpendicular bar drawn through the character, as thus 𝄵. The time of the full C was generally called the major time, and that of the reversed Ↄ the minor time.

The moderns have added to the old music a combination of times; but still we may say that we have no more than two times, common and triple: since the time of nine crotchets, or nine quavers in a bar, is but a species of triple time; and that of six crotchets, or six quavers in a bar, though called a compound common time, being measured by two beats, one down and one up, is as absolutely common time as that of four crotchets in a bar.

With respect to the velocities of the different species of time, they are as various as the measures and modifications of music, and are generally expressed by some Italian word or phrase at the beginning of each movement, as larghetto (rather slow), presto (quick), &c. But when once the time of the movement is determined, all the measures are to be perfectly equal, that is, every bar is to take up the same quantity of time, and the corresponding divisions of the bars are to be perfectly symmetrical with respect to each other. See MUSIC.

TI′MEFUL. *a.* (*time* and *full*). Seasonable; timely; early (*Raleigh*).

TI′MELESS. *a.* (from *time.*) 1. Unseasonable; done at an improper time (*Pope*). 2. Untimely; immature; done before the proper time (*Shakspeare*).

TI′MELY. *a.* (from *time.*) Seasonable; sufficiently early (*Dryden*).

TI′MELY. *ad.* (from *time.*) Early; soon (*Shakspeare*).

TIMEKEEPERS, in a general sense, denote instruments adapted for measuring time.

In a more peculiar and definite sense, timekeeper is a term first applied by Mr. John Harrison to his watches constructed for determining the longitude at sea, and for which he received, at different times, the parliamentary reward of twenty thousand pounds. Several other artists have since received also considerable sums for their improvements of timekeepers, as Arnold, Mudge, &c. See LONGITUDE.

This appellation is now become common among artists, to distinguish such watches as are made with extraordinary care and accuracy for nautical or astronomical observations.

Clocks, and all other timekeepers, consist of two principal parts, the machinery which communicates and divides the motion, and that which regulates it to a required degree of uniformity: the latter, being the most important, has engrossed the attention of improvers; the former has received the sole improvement of the going fusee, unless the invention of the remontoir can be classed under that head.

The remontoir, one of the first improvements proposed since the above period, is a contrivance for winding up the spring, or other power, which gives motion to the regulator, at short intervals, to render its operation more nearly uniform. In this case, this spring impels the wheel directly in contact with the regulator; and the rest of the machinery of the clock is merely employed in producing the effect mentioned. A description of a remontoir movement is to be found in the Horologium of Huygens, p. 18; and though Berthoud mentions its having been known in 1600, it is probable Huygens conceived the idea of it without any previous hints from others. The principle of this contrivance has been adopted by Harrison and others, but has never become general. It is supposed we possess more simple means of attaining the same advantage.

The greatest improvement ever made in regulators of time was the invention of the pendulum. Huygens is certainly the first who applied it efficaciously to clocks, as explained most satisfactorily in his Horologium; though he was not the first who thought of it as a measurer of time, nor perhaps the first who thought of applying it to clocks. But the invention of the dead-beat and anchor escapement, by which the complete practical benefit of the pendulum was obtained, was not the result of the investigations of Huygens to procure cycloidal vibrations; and by permitting only narrow vibrations, obviate the inconveniences of his method. Huygens also invented the application of a pendulum with a conical or circular motion, which the author of this paper asserts did not answer his expectation, but he does not mention his authority for this statement, directly contrary to Huygens' positive declaration in the Horologium, p. 157, that he constructed them successfully. *Plura tamen hujus generis, non sine successu, constructa fuere.*

Huygens constructed a timekeeper for finding the longitude at sea, maintained by a spring, and regulated by a pendulum, fixed so as to be least affected by the motions of the ship. Timekeepers on this construction were tried at sea with various success, which Huygens ascribes to the bad management of those who had the care of them, and our author, to the nature of their formation.

The pendulum is certainly the best regulator for fixed timekeepers; but for those required to be portable, the balance is preferable. Dr. Hooke was the first who thought of attaching a spring to the balance to supply a power to it, similar to that of gravity on the pendulum; though it is doubtful whether he used a spiral spring for this purpose. The priority of this application of the spring is disputed between him and Huygens; but Dr. Hooke seems, for various reasons, to have the best claim to it.

The next improvement was the art of jewelling the parts of greatest friction in timekeepers, in order to reduce it, and prevent the alteration of figure on the surfaces from wear.

The art of drilling small holes in rubies, necessary for the jewelling, was proposed in France during the regency, by M. Fatio, a Genevese, and was since successfully used by Harrison and others.

In the beginning of the last century, Henry Sully, an Englishman, was one of the first who carried the manufacture of watches to its present state of perfection: he laboured in making marine timekeepers, on a plan somewhat similar to that of Huygens, but died before he had fully proved them; but the author of this paper thinks that they are subject to all the inconveniences of Huygens' method, and can never be useful for portable timekeepers.

Sully published a variety of ideas and inquiries on this subject, but the only one of them which has been much used is the application of friction rollers to the pivots of timekeepers; and this method has been since frequently employed in France.

It is probable Harrison had made some progress in the improvement of timekeepers before Sully's death: he was the first who succeeded to the extent required, for the great reward offered by parliament. Most parts of his construction have been since superseded by other methods, but the principles of them are still used. Mr. Harrison invented the going fusee, in which contrivance a force is still supplied to act on the regulator, while the main spring is winding up by the intervention of a secondary spring constantly kept bent by the former while in action, and set at liberty when this is restrained. This invention is reckoned of great utility, to preserve an uniform action, and is used in all good watches. It is of peculiar importance for those timekeepers which have not the power of setting themselves in motion, which sort are esteemed the best.

Harrison also invented a compensation for the effects of heat and cold, at that time perfectly new; Graham proposed doing this by quicksilver in pendulums; but Harrison effected the same purpose by two solid metals in his gridiron pendulum, and afterwards applied the same principle to portable timekeepers, by riveting two thin pieces of brass and steel together, which, by the greater alteration of dimensions of the brass on change of temperature, became convex on the brass side in hot weather, and on the steel side in cold weather; whence, on fixing one end, the other moved according to the changes of heat and cold, and was made to contract or increase the length of the balance-spring by two pins, attached to the compensation piece, which the spring touched alternately in its vibrations. But this method is liable to objection, on account of its altering the length of the balance-spring, and is besides very difficult to adjust. This Mr. Harrison seemed sensible of by observing, that the most perfect adjustment would be one in the balance itself, if it could be effected. This desideratum was effected by Peter Le Roy, at Paris, in 1766; he fixed two thermometer tubes, one at each side of the axis of the balance, which was placed perpendicularly; these were bent into the form of a parallelogram, projecting in the plane of the radius; the bulbs were at the top, near the axis, and the tubes proceeded from them directly outwards, then downwards, for a certain extent, and then returned again to the axis, along which they ascended, above the level of the bulbs. The lower part of the tubes contained mercury, the bulbs contained spirit of wine, and the ascending part of the tubes above the mercury were open at their ends. By this contrivance, on an increase of heat, the mercury was forced nearer the centre of motion by the expansion of the spirits, and on an excess of cold, the mercury moved towards the exterior branch, and the weight towards the circumference became greater, by which the alterations of the balance, by the same causes, were compensated.

Le Roy also executed the sort of compensation for the balance desired by Harrison, and employed Harrison's metallic thermometer for regulating the balance-spring for this purpose: he formed two semiperipheries, composed in the same manner of thin laminæ of brass and steel, with the brass outside: these were fastened by their middle parts to two opposite radii of the balance, and their extremities approaching nearer the centre, in hot weather, and passing farther from it in cold weather, formed a counterbalance to the effects of change of temperature on the spring, and other parts of the balance. The effect could be increased or diminished at pleasure, by putting more or less weight at the extremities of the same circular compensation pieces; where little balls of metal were placed for this purpose. Le Roy found this method to succeed well, but preferred his mercurial thermometer to it: most authors, however, think the other decidedly superior for portable timekeepers, which opinion its great merit, on repeated trials, justifies.

In England Mr. Arnold generally passes for the author of this last metallic compensation, as he took a patent for it in 1782. It would be difficult to find an instance of a second inventor, if Mr. Arnold can be allowed that title, having obtained so much credit as he has done for a contrivance, the first author of which can be so clearly ascertained: most of the compensations applied at present to the best chronometers are, as well as that called Arnold's, essentially the same as that published so long ago by P. Le Roy.

If a regulator vibrating in a free situation should be even perfectly isochronal, this advantage would be diminished or lost, when it was connected with a train of wheels. This consideration suggested the advantage of a regulator detached from the train, except at the short intervals necessary to give it a new impulse: and an ingenious contrivance for this purpose was executed by P. Le Roy also, in 1748, and a model of it presented to the Academy of Sciences at Paris.

To form this escapement, a curved pallet is affixed to the axis under the balance; and on the same axis, but above the balance, and beneath the spiral spring, is attached a semicylindrical piece, rounded off at the end, which acts on one arm of a detent, in the form of a joiner's square, moveable on a pivot at its angle, the end of the other arm of which, when moved forward by the action of the semicylinder, comes in contact with one of the teeth of the escape-wheel, and stops its motion; after which the balance moves forward free of the train (the semicylindrical piece being so placed that it no longer touches the detent, after the latter has locked the escape-wheel), till it is overpowered by the resistance of the spiral spring, which then re-acting on it, forces it back with an accelerated velocity, which near the end of its course impels the pallet against another tooth of the escape-wheel, and forces it back about the breadth of half a tooth: this leaving the detent at liberty, it is pressed back out of the way of the teeth of the escape-wheel by a straight spring acting against one of its arms, till it comes in contact with a stop. The escape-wheel being now disengaged, its tooth in contact with the pallet (by which it was moved backwards) re-acts on the pallet, and forces it back again along with the balance in the first direction: this again brings the semicylindrical piece into contact with the detent, and stops the escape-wheel, as before described, and the vibrations alternately repeat the above effects.

In 1766 Le Roy presented another detached escapement to the Academy, which he considered superior to the former. The action of this was contrived to take place on the circumference of the balance-wheel, by which the re-action on the pivots, which took place in the other construction, was prevented: it occasioned no recoil to the escape-wheel, and was besides formed to act without a spring, the use of which latter Le Roy thought occasioned considerable disadvantage, because, if it were too weak, its action was uncertain, and if it were too strong, it caused a loss of power.

The parts of this detent were made as light as possible, that they might cause the least loss of motion to the balance, in locking and unlocking it; the escape-wheel was made with each tooth forming a distinct radius, very light and far asunder, there being only six in the whole wheel. The detent consisted of four arms, two of which alternately locked the escape-wheel, and the two other, at different sides of the balance, were in their turn acted on by it, one at the forward vibration, and the other at the returning vibration; which action caused the disengagement of the arm that locked the escape, and brought the other arm into the position for stopping the next advancing tooth; the forward vibration of the balance brought the detent and escape into a position which Le Roy called the preparation, because it prepared them so as to admit the action of the escape on the balance in the returning vibration; when, on its unlocking the escape, one of the teeth acted on a pallet placed near the circumference of the balance, and impelled it forward, till the other arm of the detent came in contact with the tooth next it.

To prevent the detent being displaced by the effect of the circular motion, a circular curb was adapted to the circumference of the balance, near each pin which disengaged the detent, so that the arms of the detent could only touch the corresponding curbs by the most violent shakes.

From those two preceding escapements of Le Roy are derived all the detached escapements since executed, without any material improvement, unless the spring detent should be reckoned one.

We do not think, though, that Berthoud has with propriety classed Mudge's escapements among the detached, Mudge himself having declared the contrary: the mechanism of Mudge's contrivance consists of a kind of double remontoir, placed beyond the whole train, the two springs of which, alternately wound up and unlocked, act in constant succession on the balance.

But we agree in opinion with Berthoud, that this construction is too complex, and requires too nice an execution ever to become generally useful.

Berthoud had laid claim to share the honour of the invention of the detached escapement with Le Roy; but it has been shown very clearly that he had no just pretensions whatsoever to do so, and that Le Roy's title to priority cannot be invalidated.

Of the detached escapements published by Berthoud, which differ only in their detents, that which has been most generally used differs only from the first construction of Le Roy, in causing no recoil to the escape-wheel; having, like it, a detent moving on pivots, and pressed by a spring.

The construction which Berthoud thinks simplest and safest has an unlocking spring, which yields in one vibration, and releases the detent in the next; the other parts are similar to the first of Le Roy.

The second construction of Le Roy has not been followed by Berthoud or by succeeding watch-makers, for which no reasons are stated in this history: in that adopted by Berthoud, the impulse of the escape-wheel is communicated to the balance, not on the circumference of the balance, as in Le Roy's, but on a pallet situated in a circle much nearer the axis: the detent also acts by springs; if, therefore, Le Roy's second method was an improvement, the art has been since retrograde in those two steps.

The construction contrived by Arnold, presented by his son to the Board of Longitude, differs principally from the French escapements, in having the joint of the detent formed by a spring instead of by pivots, which spring also supplies the place of the spring in the other constructions, that keeps the detent in its proper situation. The locking pallet is fastened to this spring; and another spring, made very delicate, runs along the back of the former, and projects a little beyond it: against this fine spring the discharging pallet, which is placed near the axis of the balance, acts; in one vibration this fine spring yields to the action of the discharging pallet, and lets it pass; but in the returning vibration, it is stopped from yielding by the back of the locking spring, and the pallet forces both springs down together, and thereby releases the tooth of the escape-wheel from the locking piece; the escape-wheel then communicates a fresh impulse to the balance by the action of one of its teeth on another pallet fixed in the edge of a circular piece attached to the axis of the balance, and concentrical with it, but which pallet is farther from the axis than the unlocking pallet; when this is done, the unlocking pallet has passed beyond the end of the springs, has released them, and the action of the larger spring forces the locking pallet, attached to it, upwards, against an adjusting screw, so as to intercept the next tooth of the escape-wheel.

Earnshaw's escapement, presented also to the Board of Longitude, is precisely on the same principle as the former; and only differs from it in the shape of the teeth of the escape-wheel, which in Earnshaw's press against the pallet of the balance by a sharp angle, but in Arnold's by a cycloidal surface; therefore in Earnshaw's the action must be rougher, the friction more, and the wear greater.

The author of the paper in Nicholson's Journal, of which the present article is an abridgment, has not positively decided as to the priority of invention of those two artists of the spring detent, but seems inclined to give it to Arnold, to whom, he says, the priority of its publication is due.

The pivots of the old detent were so fine as to occasion but little friction; some therefore think the spring detent is chiefly preferable, on account of its facility of execution and cheapness: and the author thinks these advantages sufficient to entitle it to the character of an improvement: it certainly is also superior to the other in simplicity of mechanism and in durability.

A little after the invention of the detached escapement, the isochronism of the vibrations of the spiral balance-spring were, if not discovered, at least perfected, and brought into general notice: the author thinks Hook's claim to this discovery doubtful; and the principle was so little attended to, that Harrison endeavoured to accomplish the same object by the form of the back of the pallets, and afterwards by adding a cycloidal pin to regulate the balance.

Le Roy was the first who distinctly published the discovery of a general principle proper to produce isochronism by means of the spiral spring, which he did in his Memoire sur le meilleure Maniere de mesurer le Temps en Mer, in 1766. Berthoud's investigations of this subject have been of great use, though he certainly has no just claim to dispute the invention with Le Roy; he however discovered the law which determined the isochronism of a spiral spring, that to possess this quality the spring must have an ascending force in arithmetical progression; and that this property may be effected not only by the length of the spring, but by the number of coils, and by decreasing its thickness from the centre to the extremity.

The application of the helical, or cylindrical spring, to the balance is attributed by the author to Mr. Arnold; but though its superiority, in producing isochronism, over the spiral spring, is very doubtful, yet as all manufacturers agree that it is more easily managed, he thinks it should be considered as a practical improvement.

Some have supposed that springs gradually lose their strength, and some remedies for this defect were proposed by Earnshaw that were as doubtful as the fact itself.

Among the great advantages of the isochronism of the balance-spring is the facility which it affords to procure wide vibrations, and increase the power of the regulator: another great advantage of it combined with the detached escapement, is the destruction of those variations which arise from the main spring, which is so effectual, that Le Roy in 1766 made watches which performed with great accuracy, without the fusee and chain, and in which consequently the force of the main spring acted immediately on the train of wheels. The late Mr. Arnold also tried the same construction with equal success.

The author concludes with stating his account of the progress of chronometry to be candid though not minute: the methods which do not admit of philosophical description, or have not been established by experiment, he does not consider within his limits, and places in the same class mere improvements in workmanship; though he thinks the leading principles, by which the longitude is found at sea by mechanical means, have derived a very considerable part of their perfection from the excellency of the workmanship of chronometers.

The preceding will be read with interest by those who are any way concerned in the manufacture or performance of chronometers, as it presents at once a clear and comprehensive review of all that is generally known concerning the invention, application, properties, and improvements of them.

Some have attempted to make the wide and narrow vibrations of the pendulum or balance-spring isochronous, by tapering it at its outer end; others have tapered its inner end; and both methods have succeeded to a certain extent: others have succeeded equally well by increasing the length of the spring, and having found a length that was isochronous, have observed that to further extend or to diminish its length would destroy that property; but this is not strictly true in all circumstances, because we know, upon authority on which we place much reliance, that you may shorten or lengthen a spring without at all disturbing its isochronism, by only restoring the number of coils; and if an uniform spring be coiled into from eight to eight and one quarter coils, whatever may be the length, it will be isochronal. By this means we have been credibly informed that eight-day watches constructed without fusees have performed well, notwithstanding the maintaining power was continually diminishing from the time of winding up; and a movement, where the maintaining power was varied from 40 to 140 ounces, kept the same rate for several weeks. This circumstance we believe has never been before noticed; and we are authorized to say that the particulars of the experiments on which the above fact is established will shortly be made public by the discoverer in an early number of the Repertory of Arts, &c.

We should also notice that by the preceding it appears that the construction of Le Roy, in which the chain and fusee were laid aside, affords a facility of obtaining the advantage gained by the going fusee in a very simple manner; for if the winding-up was performed by turning round the axis in the centre of the main spring, instead of by giving motion to the box in which it is contained, it is evident that the action of the main spring would not be at all interrupted during the operation; and it is obvious that the arrangement of parts necessary for this purpose could be very easily effected.

For many other attempts at improvements in timekeepers, see the Repertory of Arts, and the Retrospect of Discoveries, *passim*.

TI'MEPLEASER. *s.* (*time* and *please*.) One who complies with prevailing opinions whatever they be (*Shakspeare*).

TI'MESERVING. *s.* (*time* and *serve*.) Mean compliance with present power (*South*).

TI'MID. *a.* (*timide*, Fr. *timidus*, Latin.) Fearful; timorous; wanting courage; wanting boldness (*Thomson*).

TIMI'DITY. *s.* (*timidité*, Fr. *timiditas*, Latin.) Fearfulness; timorousness; habitual cowardice (*Brown*).

TIMMIA, in botany, a genus of the class cryptogamia, order musci. Capsule ovate; fringe double; outer, of sixteen broadish teeth; inner an obscurely furrowed, jagged membrane, the segments nearly equal and perforated. Two species, exotics.

TIMOCLEA, a Theban lady, sister to Theagenes, who was killed at Cheronæa. One of Alexander's soldiers offered her violence, after which she led her ravisher to a well, and while he believed that immense treasures were concealed there, Timoclea threw him into it. Alexander commended her virtue, and forbad his soldiers to hurt the Theban females.

TIMOCREON, a comic poet of Rhodes, who obtained poetical as well as gymnastic prizes at Olympia. He lived about 476 years before Christ, distinguished for his voracity, and resentment against Simonides and Themistocles.

TIMOLEON, a celebrated Corinthian, son of Timodemus and Demarste. He was such an enemy to tyranny, that he did not hesitate to murder his own brother Timophanes, when he attempted, against his representations, to make himself absolute in Corinth. He also rescued the Syracusans from the tyranny of Dionysius the younger, and of the Carthaginians, with the trifling force of 1000 men. This success gained Timoleon adherents in Sicily; many cities which hitherto had looked upon him as an impostor claimed his protection. When Syracuse was thus delivered from tyranny, the conqueror extended his benevolence to the other states of Sicily, and all the petty tyrants were reduced and banished from the island. A code of salutary laws was framed for the Syracusans; and the armies Carthage were defeated, and peace was at last established. The gratitude of the Sicilians was shewn every where to their deliverer. Timoleon died at Syracuse about 337 years before the Christian era, and his body received an honourable burial.

TIMON. The most celebrated of this name is a native of Athens, called Misanthrope, for his unconquerable aversion to mankind and society. He was fond of another Athenian, whose character was similar to his own, and he said that he had some partiality for Alcibiades, because he was one day to be his country's ruin. Once he went into the public assembly, and told his countrymen that he had a fig-tree on which many had ended their life with a halter, and that he was going to cut it down to raise a building on the spot; he advised all such as were inclined to destroy themselves to hasten and go and hang themselves in his garden.

Timon, or Timoan, an island on the E. coast of the peninsula of Malaya, 30 miles in circumference. It is mountainous and woody, and produces plenty of cocoa nuts and rice. Lon. 104. 25 E. Lat. 3. 0 N.

TIMOR, an island in the Indian ocean, to the W. of the N.W. point of New Holland. It is 200 miles long and 60 broad, and abounds in sandal wood, wax, and honey. The Dutch have a fort here, from which they expelled the Portuguese, in 1613. It is situate at Cupan, the principal town, on the S.W. point of the island. Lon. 124. 0 E. Lat. 10. 23 S.

TIMORLAUT, an island in the Indian ocean, between Timor and New Guinea. It is 60 miles in circumference, and the S. point is in lon. 131. 54 E. Lat. 8. 15 S.

TI'MOROUS. *a.* (*timor*, Latin.) Fearful; full of fear and scruple (*Prior*).

TI'MOROUSLY. *ad.* (from *timorous*.) Fearfully; with much fear (*Shakspeare*).

TI'MOROUSNESS. *s.* (from *timorous*.) Fearfulness (*Swift*).

TIMOTHEUS, a poet and musician of Miletus. He received an immense sum of money from the Ephesians, because he had composed a poem in honour of Diana. He died about the 90th year of his age, two years before the birth of Alexander the Great. There was also another musician of Bœotia in the age of Alexander, often confounded with the musician of Miletus. He was a great favourite of the conqueror of Darius.—2. An Athenian general, son of Conon. He signalized himself by his valour and magnanimity. He seized Corcyra, and obtained several victories over the Thebans, but his ill success in one of his expeditions disgusted the Athenians, and Timotheus, like the rest of his noble predecessors, was fined a large sum of money. He retired to Chalcis, where he died.

TIMOTHY, the disciple of St. Paul, was a native of Lystra, a city of Licaonia. His father was a Pagan, but his mother was a Jewess. He laboured with ardour in propagating the gospel, and became bishop of Ephesus, where, it is said, he was stoned to death by the heathens, A. D. 97. There are two fine epistles by St. Paul to Timothy in the sacred canon. See EPISTLE.

TI'MOUS. *a.* (from *time.*) Early; timely; not innate: obsolete (*Bacon*).

TIN, in mineralogy. See STANNUM.

TIN PYRITES. See STANNUM.

TIN SPAR. See STANNUM.

To TIN. *v.* (from the noun.) To cover with tin (*Boyle*). See TINNING.

TINA, or TINOS, the ancient Tenos, an island of the Archipelago, one of the Cyclades, to the west of Nicaria. It is 17 miles long and eight broad, and is subject to the Venetians. This island produces 16,000 pounds of silk every year, and the stockings made of it are very good; but nothing can equal the gloves which are knit here for the ladies. The fortress stands on a rock, and here is a bishop's see of the Latin church, though the Greeks have 200 papas or priests. St. Nicolo is the principal town. Lon. 25. 24 E. Lat. 37. 30 N.

TINCÆOS. (*tinca*, a tench.) The mouth of the uterus is so called by some writers, from its resemblance to a tench's mouth.

TINCAL, in mineralogy. See BORAX.

To TINCT. *v. a.* (*tinctus*, Latin; *teint*, Fr.) 1. To stain; to colour; to spot; to die (*Bacon*). 2. To imbue with a taste (*Bacon*).

TINCT. *s.* (from the verb.) Colour; stain; spot (*Thomson*).

TINCTURA. (from *tingo*, to dye a tincture.) A solution of any substance in spirit of wine, affording a tint or tinct to the menstruum. Rectified spirit of wine is the direct menstruum of the resins, and essential oils of vegetables, and totally extracts these active principles from sundry vegetable matters, which yield them to water not at all, or only in part. It dissolves likewise the sweet saccharine matter of vegetables, and generally those parts of animal bodies in which their peculiar smell and taste reside.

The virtues of many vegetables are extracted almost equally by water and rectified spirit; but in the watery and spirituous tinctures of them there is this difference, that the active parts in the watery extractions are blended with a large proportion of inert gummy matter, on which their solubility in this menstruum in a great measure depends, while rectified spirit extracts them almost pure from gum. Hence, when the spirituous tinctures are mixed with watery liquors, a part of what the spirit had taken up from the subject generally separates and subsides, on account of its having been freed from that matter, which, being blended with it in the original vegetable, made it soluble in water. This, however, is not universal, for active parts of some vegetables when extracted by rectified spirits are not precipitated by water, being almost equally soluble in both menstrua.

Rectified spirit may be tinged of all colours by vegetables, except blue: the leaves of plants, in general, will give out little of their natural colour to watery liquors, communicate to spirit the whole of their green tincture, which for the most part proves elegant, though not very durable.

Fixed alkaline salts deepen the colour of spirituous tinctures; and hence they have been supposed to promote the dissolving power of the menstruum, though this does not appear from experience: in the trials which have been made to terminate this affair, no more was found to be taken up in the deep coloured tinctures than in the paler ones, and often not so much; if the alkali be added after the extraction of the tincture, it will heighten the colour as much as when mixed with the ingredients at first. The addition of these salts in making tinctures is not only needless but prejudicial, as they generally injure the flavour of aromatics, and superadd a quality sometimes contrary to the intention of the medicine.

Volatile alkaline salts, in many cases, promote the action of the spirits. Acids generally weaken it; unless when the acid has been previously combined with the vinous spirit into a compound of new qualities, called dulcified spirit. The following are the chief forms of this preparation.

T. ALOES. This preparation possesses stomachic and purgative qualities, but should never be given where there is a tendency to hœmorrhoids. In choleric cases and amennorhæa it is preferred to other purges.

T. ALOES COMPOSITA. A more stimulating compound than the former. It is a useful application to old indolent ulcers.

* T. ALOES SULPHURICA. With the bitter infusion a drachm or two of this elegant tincture is extremely serviceable against gouty and rheumatic affections of the stomach and bowels, and also in the weaknesses of those organs which frequently attend old age.

T. ASSAFÆTIDÆ. Diluted with water, this is mostly given in all kinds of fits, by the vulgar. It is a useful preparation as an antispasmodic, especially in conjunction with vitriolated zinc.

T. BALSAMI PERUVIANI. A stimulating tincture with all the virtues of the Peruvian balsam.

T. BENZOINI COMPOSITA. This tincture is more generally applied externally to ulcers and wounds than given internally, though possessing expectorant, antispasmodic, and stimulating powers. Against coughs, spasmodic affections of the stomach and bowels, and diarrhæa, produced by ulcerations of those parts, it is a very excellent medicine.

T. CANTHARIDIS, or T. LYTTÆ. A very acrid, diuretic and stimulating preparation, which should always be administered with great caution from its known action on the parts of generation. In chronic eruptions on the skin, and dropsical diseases of the aged, it is often very useful when other medicines have been inert.

T. CARDAMOMI. A powerful stimulating

carminative. In spasm of the stomach, an ounce with some other diluted stimulant is given with advantage.

T. CARDAMOMI COMPOSITA. A useful and elegant carminative and cordial.

T. CASCARILLÆ. A stimulating aromatic tonic, that may be exhibited in debility of the bowels and stomach, and in those cases of fever in which the Peruvian bark proves purgative.

T. CASTOREI. An antispasmodic tincture.

T. CASTOREI COMPOSITA. A very powerful stimulant and antispasmodic, mostly exhibited in hysterical affections in a dilute form.

T. CATECHU. An aromatic adstringent, mostly given to check diarrhæas, and very useful in debilities of the stomach and bowels producing borborygma and acidities.

T. CINCHONÆ. This possesses all the virtues of the bark and proof spirit.

*T. CINCHONÆ AMMONIATA. The virtues of the spiritus ammoniæ compositus and the Peruvian bark are here combined.

T. CINCHONÆ COMPOSITA. A very excellent tonic and stomachic stimulant.

T. CINNAMOMI. Stimulant and stomachic.

T. CINNAMOMI COMPOSITA. A very powerful stimulating carminative, given in spasmodic affections of the stomach and bowels, and those cases of vomiting which arise from a morbid irritability of the stomach.

T. COLOMBÆ. A tonic and stomachic tincture, calculated to repair the tone of the stomach and bowels, when impaired by bilious vomiting and purgings after removing the causes.

*T. CORTICIS AURANTII. This is seldom given alone, but in conjunction with other tonics and stomachics, to which it imparts a pleasant flavour.

*T. CROCI. A much esteemed tincture for imparting a beautiful colour to other liquid medicines, and possessing the virtues of the saffron.

T. FERRI AMMONIATI. An excellent tonic and adstringent. See FERRUM AMMONIACALE.

T. FERRI MURIATIS. Tonic and adstringent virtues are attributed to this compound. In relaxations of the kidneys and spasmodic affections of the urinary passages it is particularly serviceable.

*T. GALBANI. The virtues of the galbanum are completely extracted in this tincture. See GALBANUM.

T. GENTIANÆ COMPOSITA. A very excellent bitter tonic and stomachic.

T. GUAIACI. This is in very general use against chronic rheumatic affections, in which complaint it is particularly serviceable. It possesses stimulating and diaphoretic powers.

T. GUAIACI AMMONIATA. A more powerful stimulant than the above.

T. HELLEBORI NIGRI. This preparation is seldom used but in obstinate cases of amenorrhæa, from the known action of hellebore on the uterus.

T. JALAPÆ. A stimulating cathartic.

T. KINO. A mild adstringent.

*T. MOSCHI. Mostly administered in conjunction with other antispasmodics in hysterical, nervous, and spasmodic affections.

T. MYRRHÆ. A warm stimulating stomachic and corroborant; it is also in common use as a detergent to ulcerated throats, mixed and diluted in the form of gargle.

T. OPII. For its virtues, see OPIUM.

T. OPII CAMPHORATA. An excellent diaphoretic and carminative anodyne.

T. RHEI. A stomachic aperient and purgative.

T. RHEI COMPOSITA. An agreeable stomachic purgative.

T. RHEI AMARA. A tonic stomachic and aperient.

*T. RHEI CUM ALOE. A more stimulating tincture than either of the former.

*T. RHEI DULCIS. A more pleasant tincture than the tinctura rhabarbari.

*T. SABINÆ COMPOSITA. A useful emmenagogue, possessing stimulating and antispasmodic virtues, and extremely serviceable in the hysterical epilepsy of young women, which arises from irregularity in the menstrual discharge.

T. SCILLÆ. The virtues of the squill reside in this compound.

T. SENNÆ. A carminative, aperient, and purgative.

T. SERPENTARIÆ. This tincture possesses, in addition to the virtues of the spirit, those of the serpentariæ.

T. VALERIANÆ. A useful antispasmodic in conjunction with others.

T. VALERIANÆ AMMONIATA. A strong antispasmodic and stimulating tincture.

T. VERATRI, or HELLEBORI NIGRI. A very active alterative, recommended in the cure of epilepsy and cutaneous eruptions. Its administration requires great caution; the white hellebore being a powerful poison.

T. ZINGIBERIS. A stimulating carminative.

We have here given the usual tinctures in most of the collegiate pharmacopœias. In the recent pharmacopœia of London all those marked with a * are omitted, and the following are introduced.

T. CAPSICI, for its stimulating warmth.

T. DIGITALIS, as a diuretic, and to diminish arterial action.

T. HUMULI, as an anodyne and stomachic bitter.

T. HYOSCYAMI, as a relaxant and narcotic.

TI'NCTURE. *s.* (*teinture*, Fr. *tinctura*, from *tinctus*, Lat.) 1. Colour or taste superadded by something (*Wotton*). 2. Extract of some drug made in spirits; an infusion in spirits. See TINCTURA.

To TI'NCTURE. *v. a.* (from the noun.) 1. To imbue or impregnate with some colour or taste (*Blackmore*). 2. To imbue the mind.

To TIND. *v. a.* (*tendgan*, Gothic; ꞇenꝺan, Sax.) To kindle; to set on fire.

TINDAL (Matthew), a deistical writer, born 1657, at Beer-ferres, Devonshire. He entered at Lincoln college, Oxford, 1672, and afterwards removed to Exeter, and thence was elected fellow of All-Souls. Under James II. he declared himself a papist, but afterwards took the oaths to secure his fellowship. He died in London 1733. He is known for two publications, the first published 1706, The Rights of the Christian Church asserted against the Romish and all other Priests, &c. 8vo.—and the other, published 1730, in 8vo. Christianity as old as the Creation, or the Gospel a Republication of the Religion of Nature. In the former of these his intention was, in subtle and insinuating language, to destroy the authority of the church; and in the latter, his design, in the most artful manner, is to set aside revealed religion, and to establish that there is no other religion but that of the law of nature imprinted upon the heart of man. These works were deservedly censured, and among the ablest opponents of his tenets he had Dr. Hickes, who had been his tutor at Lincoln, Dr. Conybeare, afterwards bishop of Bristol, Leland, Foster, and others. He wrote some tracts besides, on civil and religious liberty, and he left at his death a second volume to his Christianity as old as the Creation.

Tindal (Nicholas), nephew to Matthew, was educated at Exeter college, Oxford. He was afterwards fellow of Trinity college, and obtained the livings of Alverstoke, Hants, and of Great Waltham, near Chelmsford, and afterwards succeeded to Colbourne, in the isle of Wight. He died at Greenwich, where he was chaplain to the hospital, at an advanced age, 1774. He published two quarto numbers of an intended History of Essex, in 3 vols. which, however, he relinquished for the translation of Rapin's History of England, in which he was assisted by Morant. This last work succeeded so well that his booksellers handsomely gave him a present of 200 guineas. He published besides Cantemir's History of the Ottoman Empire, folio—and Polymetis abridged, &c.

TI′NDER. *s.* (ꞇẏnꝺꞃe, Sax.) Any thing eminently inflammable placed to catch fire (*Shakspeare*).

TI′NDERBOX. *s.* (*tinder* and *box.*) The box for holding tinder (*Atterbury*).

TINE. *s.* (*tinne*, Islandic.) 1. The tooth of a harrow; the spike of a fork (*Mortimer*). 2. Trouble; distress (*Spenser*).

To Tine. *v. a.* (ꞇẏnan, Sax.) 1. To kindle; to light; to set on fire (*Dryden*). 2. (ꞇınan, Sax.) To shut.

To Tine. *v. n.* 1. To rage; to smart (*Spenser*). 2. To fight (*Spenser*).

TINEA, in the entomology of Fabricius, a tribe of the genus Phalæna, which see.

Tinea capitis. (from *teneo*, to hold.) The scald-head. A genus of disease in the class locales, and order dialyses of Cullen; characterized by small ulcers at the root of the hairs of the head, which produce a friable white crust.

To TINGE. *v. a.* (*tingo*, Lat.) To impregnate or imbue with a colour or taste (*Newton*).

TI′NGENT. *a.* (*tingens*, Lat.) Having the power to tinge (*Boyle*).

TI′NGLASS. *s.* (*tin* and *glass.*) Bismuth.

To TI′NGLE. *v. n.* (*tingelen*, Dutch.) 1. To feel a sound, or the continuance of a sound, in the ears (*Brown*). 2. To feel a sharp quick pain with a sensation of motion (*Pope*). 3. To feel either pain or pleasure with a sensation of motion (*Arbuthnot*).

TINIAN, an island in the Pacific Ocean, one of the Ladrones, 12 miles in length and six in breadth. The soil is dry; and being somewhat sandy, is the less disposed to rank and over-luxuriant vegetation. The land rises in gentle slopes from the shore to the middle of the island, intermixed with valleys of an easy descent; which are beautifully diversified with the mutual encroachments of the woods and lawns. The woods consist of tall and well-spread trees, and the lawns are covered with clean and uniform turf, producing fine trefoil, and variety of flowers. Here are at least 10,000 cattle, all milk white, except their ears, which are brown or black; also a vast number of fowls, which are easily caught, and plenty of wild hogs. In the woods are prodigious quantities of cocoa-nuts, cabbage-trees, guavoes, limes, sweet and sour oranges, and bread fruit. Here are also vegetables proper for the scurvy; such as water-melon, dandelion, creeping purslain, mint, scurvy-grass, and sorrel. Here are some ruins of a particular kind, consisting of two rows of square pyramidical pillars, each pillar being about six feet from the next, and the distance between the rows is 12 feet; on the top of each there is a semi-globe, with the flat surface upward, and they are composed of sand and stone cemented together. The climate is extremely healthful, for the rains are not continual, but fall in frequent refreshing showers. There are no streams, but the water of the wells and springs is excellent. The principal inconvenience arises from the number of muskitoes, and other kinds of flies; and there are likewise insects called ticts, which fasten upon the limbs and bodies of men, and bury their heads under their skins. The road is inconvenient, and, in some seasons, there is little security for a ship at anchor. Lon. 146. 0 E. Lat. 15. 0 N.

To TINK. *v. n.* (*tinnio*, Latin; *tincian*, Welsh.) To make a sharp shrill noise.

TI′NKER. *s.* (from *tink*, because in their work they make a tinkling noise.) A mender of old brass (*Shakspeare*).

To TI′NKLE. *v. n.* (*tinter*, Fr. *tinnio*, Latin.) 1. To make a sharp quick noise; to clink (*Dodsley*). 2. To hear a low quick noise.

TI′NMAN. *s.* (*tin* and *man.*) A manufacturer of tin, or iron tinned over (*Prior*).

TINMOUTH, a seaport in Northumberland, at the mouth of the Tyne, nine miles east of Newcastle. It has a castle, seated on a high rock, inaccessible on the sea-side, and well mounted with cannon. There is a bar across the mouth of the river, which is not above seven feet deep at low water. There are dangerous rocks about it, called the Black Middins; but there are light-houses to guide the ships by night. Here ships take in their loading of coal, and of goods brought from Newcastle. Lon. 1. 16 W. Lat. 55. 6 N.

TI′NNER. *s.* (from *tin*; ꞇın, Sax.) One who works in the tin mines (*Bacon*).

TINNING, the art of covering any metal with a thin coating of tin. Copper and iron are the metals most commonly tinned. The use of tinning these metals is to prevent them from being corroded by rust; as tin is not so easily acted upon by the air or water as iron and copper are.

What are commonly called tin-plates, or sheets, so much used for utensils of various kinds, are in fact iron plates coated with tin.

The principal circumstance in the art of tinning is, to have the surfaces of the metal to be tinned perfectly clean and free from rust, and also that the melted tin may be perfectly metallic, and not covered with any ashes or calx of tin.

Tinning of iron.—When iron plates are to be tinned, they are first scoured, and then put into what is called a pickle, which is sulphuric acid diluted with water; this dissolves the rust or oxid that was left after scouring, and renders the surface perfectly clean. They are then again washed and scoured. They are now dipped into a vessel full of melted tin, the surface of which is covered with fat or oil, to defend it from the action of the air. By this means, the iron coming into contact with the melted tin in a perfectly metallic state, it comes out completely coated.

When a small quantity of iron only is to be tinned, it is heated, and the tin rubbed on with a piece of cloth, or some tow, having first sprinkled the iron with some powdered resin, the use of which is to reduce the tin that may be oxydated. Any inflammable substance, as oil for instance, will have in some degree the same effect, which is owing to their attraction for oxygen.

Tinning of copper.—Sheets of copper may be tinned in the same manner as iron. Copper boilers, saucepans, and other kitchen utensils, are tinned after they are made. They are first scoured, then made hot, and the tin rubbed on as before with resin. Nothing ought to be used for this purpose but pure grain tin; but lead is frequently mixed with the tin, both to adulterate its quality, and make it lie on more easily; but it is a very pernicious practice, and ought to be severely reprobated.

To whiten brass or copper by boiling.—Put the brass or copper into a pipkin with some white tartar, alum, and grain tin, and boil them together. The articles will soon become covered with a coating of tin, which, when well polished, will look like silver. It is in this manner that pins, and many sorts of buttons, are whitened.

TINNITUS AURIUM. See Paracusis.

TI′NNY. *a.* (from *tin.*) Abounding with tin.

TI′NPENNY. *s.* A certain customary duty anciently paid to the tithingmen (*Bailey*).

TI′NSEL. *s.* (*etincelle,* Fr.) 1. A kind of shining cloth (*Fairfax*). 2. Any thing shining with false lustre; any thing showy and of little value (*Swift*).

To Ti′nsel. *v. a.* (from the noun.) To decorate with cheap ornaments; to adorn with lustre that has no value (*Cleaveland*).

TINT. *s.* (*teinte,* Fr. *tinta,* Ital.) A die; a colour (*Pope*).

TINUS, in botany. See Viburnum.

TI′NY. *a.* (*tint, tynd,* Danish.) Little; small; puny. A burlesque word (*Swift*).

TIP. *s.* (*tip, tipken,* Dutch.) Top; end; point; extremity (*Pope*).

To Tip. *v. a.* (from the noun.) 1. To top; to end; to cover on the end (*Milton*). 2. To strike slightly; to tap (*Swift*).

TIPHIA, in zoology, a genus of the class insecta, order hymenoptera. Mouth with a membranaceous, rounded jaw, the mandible arched and acute; tongueless; feelers four, filiform, unequal, and inserted in the middle of the lip; antennas filiform, short, convolute; sting concealed within the abdomen. Twenty-seven species, scattered over the globe. They are thus subdivided.

A. Jaw vaulted; lip membranaceous, emarginated: constituting the tribe larra of Fabricius.

B. Jaw rounded; lip horny, three-toothed.

The only species indigenous to our own country is tiphia femorata; black, four hind-thighs angular, rufous; thorax punctured, a little downy; abdomen oblong glossy-black; wings brown.

TIPPERARY, a county of Ireland, in the province of Munster, 60 miles long, and 40 broad; bounded on the N. by King's county, on the E. by Queen's county and Kilkenny, on the S. by Waterford, and on the W. by Galway, Clare, Limerick, and Cork. The S. part is fertile; but the N. is rather barren, and terminates in a row of twelve mountains, the highest in Ireland, called Phelem-dhe-Madina. It contains 147 parishes, and sends eight members to parliament. The river Shure runs through it from N. to S. Cashel is the capital.

Tipperary, a town of Ireland, in the county of the same name, nine miles S.S.W. of Cashel.

TI′PPET. *s.* (ꞇæppeꞇ, Saxon.) Something worn about the neck (*Bacon*).

To TI′PPLE. *v. n.* (*tepel,* a dug, old Teutonic.) To drink luxuriously; to waste life over the cup (*Shakspeare*).

To Ti′pple. *v. a.* To drink in luxury or excess (*Cleaveland*).

Ti′pple. *s.* (from the verb.) Drink; liquor (*L'Estrange*).

TI′PPLED. *a.* (from *tipple.*) Tipsy; drunk (*Dryden*).

TI′PPLER. *s.* (from *tipple.*) A sottish drunkard; an idle drunken fellow.

TI′PSTAFF. *s.* (*tip* and *staff.*) 1. An officer with a staff tipped with metal. 2. The staff itself so tipt (*Bacon*).

TI′PSY. *a.* (from *tipple.*) Drunk; overpowered with excess of drink (*Shakspeare*).

TI′PTOE. *s.* (*tip* and *toe.*) The end of the toe (*Herbert*).

TIPULA. Crane-fly. In zoology, a genus of the class insecta, order diptera. Mouth with a very short, membranaceous proboscis, the back grooved, and receiving a bristle; hanstel short, without a sheath; feelers two, incurved, filiform, and longer than the head; antennas mostly filiform. A hundred and thirty-five species, scattered over the globe, but by far the greater part indigenous to Europe; forty common to our own country. They are thus subdivided.

A. Wings expanded.

B. Wings incumbent; the sections about equal in regard to number.

Most of this genus have a great resemblance to the gnat: the larger are known by the name of sempstresses; the small by that of culiciform. The latter, in fine summer evenings, flutter about the sides of rivers in legions. The shrill noise which they make with their wings is not very discernible unless they are very near. These are often mistaken for gnats; but they want their proboscis, and their manners are far more inoffensive.

The tipulæ, before they become inhabitants of the air, creep about in their larve state. The larves of the larger kinds dwell in holes of decayed willows, and there change into chrysalids. In that state, they breathe through small curved spiracles. The larves and chrysalids of the smaller tipulæ are generally found in water; they are extremely various both in colour and form: some have cylindrical tubes through which they breathe, even while considerably immersed in water, by stretching their points to the surface. They swim with great nimbleness, but seldom forsake the hole they have dug in the bank of the river. There are others that spin a silken coat, which receives part of their long body before their transformation. After these operations are performed all of them renounce their reptile and aquatic life, having received instruments of flight from the hands of nature. Their frame is at first so weak, that a touch is enough to crush them. They are sometimes of a beautiful green, sometimes coal black; but the most remarkable are those whose fore legs, though extremely long, do not touch the ground, but move in the air like antennas. Having attained this their last and perfect state, their life is of very short duration; they propagate their kind, and perish almost immediately afterwards.

We shall select a few specimens.

1. T. pectinicornis. Father long-legs. Antennas pectinate; wings with a black spot; abdomen rufous at the base, barred with yellow in the middle, and tipt with black. Inhabits Europe; and too well known in our own country to require a more minute description.

2. T. rivosa. Wings white, hyaline, with three large brown patches near the thicker margin; poisers tipt with yellow. Inhabits most moist places of Europe; and well known among ourselves. The largest of the tribe, often more than an inch and an half long in the body. The larve dusky-grey, of a lengthened form, and wingless. It is found beneath the roots of grass in meadows and gardens; and in the months of July and August changes into a lengthened pointed pupe, the complete insect being perfected in September.

3. T. tritici. Dull rufous; wings hyaline with a fringed margin; eyes black. Inhabits our own country and other parts of Europe; very minute. The larve citron colour, with folded papillæ at the margin, a sharp head and truncate tail; skips, and is found in great numbers in the ears of wheat, to which it is very injurious; is destroyed by the ichneumon tipulæ. Pupe narrow, reddish, and pointed at each end.

4. T. berberina. Berberry cranefly. Wings sooty, with a white base and marginal spot; thorax and abdomen red. Inhabits Austria; and forms small strumous excrescences on the branches of the berberry. Pupe red, with setaceous antennas.

5. T. moschifera. Musk cranefly. Wings cinereous: thorax and abdomen yellow. Inhabits Chili. This insect has a very pleasant musky smell, and is used by the female natives to perfume their garments. See Nat. Hist. Pl. CLXXXI.

TIRANO, a town of the country of the Grisons, capital of the Upper Terzero. It contains several handsome buildings, but from the narrowness of the streets, and many ruinous houses, its general appearance is desolate. The river Adda divides it into two parts, which are joined by a stone bridge of a single arch. There are some remains of the stone walls by which it was formerly surrounded, and which, with an adjoining fortress, were built by Ludovico Sforza, against the incursions of the Grisons, but were dismantled by the latter, when they acquired possession of the Valteline. The staple commerce of this town consists in the exportation of wine and silk. Near the town, on the other side of the Adda, is the magnificent church of the Madona, or virgin Mary, much visited by the catholic pilgrims. The massacre of the protestants of the Valteline, in 1620, began in this town. It is 17 miles S.W. of Bormio. Lon. 9. 46 E. Lat. 46. 12 N.

TIRE. *s.* (*tuyr*, Dutch.) 1. Rank; row (*Raleigh*). 2. (corrupted from *tira.*) A head-dress (*Spenser*). 3. Furniture; apparatus (*Philips*).

To TIRE. *v. a.* (ꞇıꞃıan, Sax.) 1. To fatigue; to make weary; to harass; to wear out with labour or tediousness (*Dryden*). 2. It has often *out* added, to extend the signification (*Bacon*). 3. (from *attire* or *tire*, from *tiara.*) To dress the head (*Kings*).

To TIRE. *v. n.* (ꞇeoꞃıan, Sax.) To fail with weariness.

TI′REDNESS. *s.* (from *tired.*) State of being tired; weariness (*Hakewill*).

TIREE, a small but rich island of Scotland, one of the Hebrides, lying to the S.W. of Col, and noted for its marble quarry and a handsome breed of little horses.

TIREH, a town of Turkey in Asia, in Natolia, situate on the Meinder, 32 miles S.S.E. of Smyrna. Lon. 27. 20 E. Lat. 38. 10 N.

TIRESIAS, a celebrated prophet of Thebes, son of Everus and Chariclo. He lived during the time that Polydorus, Labdacus, Laius, Œdipus, and his sons, sat on the throne of Thebes. It is said, that in his youth he found two serpents in copulation, and that upon striking them with a stick, he found himself suddenly changed into a girl. Seven years after he found some serpents in the same manner, and he recovered his original sex. When a woman, Tiresias had married, and therefore Jupiter and Juno wished him to decide which of the sexes received greater pleasure from the connubial state. Tiresias declared, that the pleasure which the female received was ten times greater than that of the male. Juno, who supported a different opinion, punished Tiresias, by depriving him of his eye-sight. But Jupiter, in compensation, bestowed upon him the gift of prophecy, and permitted him to live seven times more than the rest of men. These causes of the blindness of Tiresias, supported by Ovid, Hyginus, and others, are contradicted by Apollodorus, Callimachus, Propertius, &c. During his life-time, Tiresias was an infallible oracle to all Greece. The generals, during the Theban war, consulted him, and found his predictions verified. He at last died, after drinking the waters of a cold fountain, which froze his blood. He was buried with great pomp by the Thebans, and honoured as a god. Homer represents Ulysses as going to the infernal regions to consult Tiresias concerning his return to Ithaca.

TI'RESOME. *a.* (from *tire.*) Wearisome; fatiguing; tedious (*Addison*).

TI'RESOMENESS. *s.* (from *tiresome.*) Act or quality of being tiresome.

TI'REWOMAN. *s.* (*tire* and *woman.*) A woman whose business is to make dresses for the head (*Locke*).

TI'RINGHOUSE. TI'RINGROOM. *s.* (*tire* and *house* or *room.*) The room in which players dress for the stage (*Shakspeare*).

TIRO (Tullius), a freedman of Cicero, greatly esteemed by his master for his learning and good qualities. It is said that he invented short-hand writing among the Romans. He wrote the life of Cicero, and other treatises now lost. (*Cic.*).

TIROL, or TYROL, a princely county of Germany, in the circle of Austria; bounded on the N. by Suabia and Bavaria, E. by the duchies of Salzburg and Carinthia, S. by Italy, and W. by Swisserland. Though a mountainous country, its valleys are fertile in corn and wine, and it has an excellent breed of cattle. It likewise yields salt, all kinds of ores, and various sorts of precious stones. Its copper contains not only silver but also some gold. The principal rivers are the Inn, Adige, and Eysach. The country is divided into three parts; Tyrol, properly so called, the principality of Trent, and the principality of Brixen. It belonged to the house of Austria, but was overrun by the French and Bavarians in 1805; and by the treaty of Presburg was ceded to Bavaria. Inspruck is the capital.

'TIS. Contracted for *it is* (*Shakspeare*).

TI'SICAL. *a.* (for *phthisical.*) Consumptive.

TI'SIC. *s.* (corrupted from *phthisic.*) Consumption; morbid waste.

TISIPHONE, one of the Furies, daughter of Nox and Acheron, was the minister of divine vengeance upon mankind, and punished the wicked in Tartarus. She was represented with a whip in her hand, serpents hung from her head, and were wreathed round her arms.

TI'SSUE. *s.* (*tissue*, Fr. ꞇıꞅan, to weave, Norman Saxon.) Cloth interwoven with gold or silver, or figured colours (*Dryden*).

To TI'SSUE. *v. a.* (from the noun.) To interweave; to variegate (*Wotton*).

TIT. *s.* 1. A small horse: generally in contempt (*Denham*). 2. A woman: in contempt (*Dryden*). 3. A titmouse, or tomtit; a small bird.

TITAN, or TITANUS, a son of Cœlus and Terra, brother to Saturn and Hyperion. He was the eldest of the children of Cœlus; but he gave Saturn the kingdom of the world, provided he raised no male children. When the birth of Jupiter was concealed, Titan made war against Saturn, and imprisoned him till he was replaced on his throne by his son Jupiter. Titan is a name applied to Saturn by Orpheus and Lucian; to the sun by Virgil and Ovid; and to Prometheus by Juvenal.

TITANES, a name given to the sons of Cœlus and Terra. They are 45 in number, according to the Egyptians. Apollodorus mentions 13, Hyginus 6, and Hesiod 20, among whom are the Titanides. (See TITANIDES.) The most known of the Titans are Saturn, Hyperion, Oceanus, Japetus, Cottus, and Briareus, to whom Horace adds, Typhœus, Mimus, Porphyrion, Rhœtus, and Enceladus, who are by other mythologists reckoned among the giants. They were all of a gigantic stature, and with proportionable strength. They were treated with great cruelty by Cœlus, and confined in the bowels of the earth, till their mother pitied their misfortunes, and armed them against their father. The wars of the Titans against the gods are very celebrated in mythology. They are often confounded with that of the giants; but it is to be observed, that the war of the Titans was against Saturn, and that of the giants against Jupiter.

TITANIDES, the daughters of Cœlus and Terra; six in number according to Hesiod, or seven according to Orpheus. The most celebrated were Tethys, Themis, Dione, Thea, Mnemosyne, Ops, Cybele, Vesta, Phœbe, and Rhea.

TITANITE, in mineralogy. See TITANIUM.

TITANIUM. Titanite, in mineralogy, a genus of the class metals. Orange-red, very hard, in minute agglutinated grains, specific gravity undecided; not fusible by any known heat, but when exposed hot to the open air forming a blue or purple oxyd: precipitating a white powder when its crystals or red oxyd are fused in four times their weight of potash, and the whole dissolved in water. Four species.

1. T. menackanite. Menackanite. In small

irregularly shaped grains, black, easily pulverized, and the powder attracted by the magnet. Found in the valley of Menackan in Cornwall, in small grains resembling gunpowder of no determinate shape, and often mixed with fine grey sand: does not detonate with nitre, but melts with two parts of fixed alkali into an olive-coloured mass, from which nitric acid precipitates a white powder, and this powder mixed with diluted sulphuric acid, so that the mass be not too liquid, and evaporated to driness, produces a blue mass; before the blowpipe it does not decrepitate, but with microcosmic salt it acquires a greenish tinge, which becomes brown on cooling; specific gravity 4.427: contains oxyd of iron 46, oxyd of titanium 45, with some silex and manganese. (*Gregor.*)

2. T. iserina. Iserine. In small rounded grains, brownish-black, hard, brittle, of a conchoidal texture, not attracted by the magnet. Found in the sand of the river Iser, in Bohemia, of an iron black colour tending to brown, and is hard, heavy, and brittle.

3. T. ruthila. Ruthile. Compact, reddish-brown, opake, of a foliated texture, forming a violet-black glass with microcosmic salt. Found in Hungary, the Pyrenees, the Alps, and in Britanny, generally crystallized in four or six-sided prisms, or acicular; with borax forming a deep yellow glass with a tinge of brown: specific gravity from 4.180 to 4.246: when pure, is composed entirely of oxyd of titanium. A variety called anatasæ is found in Dauphiny, with crystals more elongated; specific gravity 3,857.

4. T. nigrina. Nigrine. Sphene. Compact, hard, brittle, with a waxy lustre and foliated texture, imperfectly soluble in muriatic acid, from which it precipitates a clammy yellowish mass with the addition of ammonia. Found in Bavaria, Norway, and near St. Gothard, sometimes massive or disseminated, sometimes crystallized in short obtuse-angled four-sided prisms; colour yellowish, reddish or blackish-brown, rarely whitish-grey, with a whitish grey powder; infusible before the blowpipe, but in charcoal convertible into a black opake porous slag: specific gravity 3,510: contains oxyd of titanium 33, silex 35, lime 33. (*Klaproth.*)

TITBI′T. *s.* (properly *tidbit.*) Nice bit; nice food (*Arbuthnot*).

TITHE. *s.* (ꞇeoða, Saxon, tenth.) 1. The tenth part; the part assigned to the maintenance of the ministry (*Bacon*). 2. The tenth part of any thing (*Shakspeare*). 3. Small part; small portion (*Bacon*).

To TITHE. *v. a.* (ꞇeoðian, Sax.) To tax; to levy the tenth part (*Spenser*).

To TITHE. *v. a.* To pay tithe (*Tusser*).

TI′THEABLE. *a.* (from *tithe.*) Subject to the payment of tithes; that of which tithes may be taken (*Swift*).

TITHENIDIA, a festival of Sparta, in which nurses, τιθηναι, conveyed male infants entrusted to their charge to the temple of Diana, where they sacrificed young pigs. During the time of the solemnity, they generally danced and exposed themselves in ridiculous postures.

TI′THER. *s.* (from *tithe.*) One who gathers tithes.

TITHES, TYTHES, TENTHS, DECIMÆ, or DIXMES, the tenth part of the increase, yearly arising and renewing from the profits of lands, the stock upon lands, and the personal industry of the inhabitants; allotted to the clergy for their maintenance.

Tithes, with regard to their several kinds or natures, are personal, predial, and mixt.

Personal Tithes, are those due or accruing from the profits of labour, art, trade, navigation, and industry of men; and of these only the tenth part of the clear gains and profits is due.

Predial Tithes, are those which arise merely and immediately from the ground; as grain of all sorts, hay, wood, fruits, herbs; for a piece of land or ground, being called in Latin *prædium* (whether it be arable, meadow, or pasture), the fruit or produce thereof is called *predial.*

Mixt Tithes, are such as arise from beasts, and other animals fed with the fruits of the earth; as cheese, milk, wool, lambs, calves, fowls, &c.

Tithes, with regard to their value, are divided into great and small.

Great Tithes, are those of corn, hay, and wood.

Small Tithes, are the predial tithes of other kinds, together with those that are called mixt and personal. It is said, that this division may be altered by custom, which will make wood a small tithe in the endowment of the vicar; by quantity, which will convert a small tithe into great, if the parish is generally cultivated with it; and by change of place, which makes the same things, e. g. hops in gardens, small tithes, in fields great tithes. But it has been admitted, that the quantity of land within any parish, that is cultivated for a particular produce, cannot change the nature of the tithe: and, according to this opinion, the law is now settled, that the tithes are to be denominated great or small, according to the nature and quality thereof, and not according to the quantity. It is a general rule, that of common right tithes are to be paid for every thing that yields an annual increase; but this rule admits of exceptions, e. g. tithe is due from saffron, though gathered but once in three years, and on wood that is felled or lopped, called *sylva cædua*, though it is not renewed every year: and on the other hand, tithes shall be paid for the produce of seeds, as of clover, sown on the same ground, though renewed oftener than once a year. No tithes shall be paid of common right for any thing that is of the substance of the earth, or which is not of annual increase, as stone, lime, coal, tin, lead, and such like; nor for creatures that are feræ naturæ, or of a wild nature, as deer, hawks, fish, &c. whose increase so as to profit the owner is not annual, but casual; unless tithes in either of these cases are payable by custom. Lands, and their occupiers, may be exempted or discharged from the payment of tithes, either in part or totally, by a real composition, or by custom or prescription.

A real composition is when an agreement is made between the owner of the lands, and the parson or vicar, with the consent of the ordinary or patron, that such lands shall for the future be discharged from payment of tithes, by reason of some land, or other real recompence given to the parson, in lieu and satisfaction thereof. But these compositions are now restrained by the disabling statute 13 Eliz. cap. 10.

A discharge by custom or prescription is, where time out of mind such persons, or such lands, have been either partially or totally discharged from the payment of tithes. This custom, or prescription, is either *de modo decimandi*, or *de non decimando*. A prescription *de non decimando*, is a claim to be entirely discharged of tithes, and to pay no compensation in lieu of them. Thus the king by his prerogative is discharged of all tithes. So a vicar shall pay no tithes to the rector, nor the rector to the vicar: but these privileges are personal to both the king and the clergy; for their tenant or lessee shall pay tithes of the same land, though in their own occupation it is not tithable. And, generally speaking, it is an established rule, that, in lay hands, *modus de non decimando non valet*. But spiritual persons or corporations, as monasteries, abbots, bishops, and the like, were always capable of having their lands totally discharged of tithes, by various ways, as, 1. by real composition; 2. by the pope's bull of exemption; 3. by unity of possession, as when the rectory of a parish, and lands in the same parish, both belonged to a religious house, those lands were discharged of tithes by this unity of possession; 4. by prescription, having never been liable to tithes by being always in spiritual hands; 5. by virtue of their order, as the knights Templars, Cistercians, and others, whose lands were privileged by the pope with a discharge of tithes. Though, upon the dissolution of abbeys by Henry VIII. most of these exemptions from tithes would have fallen with them, and the lands become tithable again, if they had not been supported and upheld by the statute 31 Hen. VIII. cap. 13. which enacts, that all persons who should come to the possession of the lands of any abbey then dissolved, should hold them free and discharged of tithes, in as ample a manner as the abbeys themselves formerly held them. And from this original have sprung all the lands, which, being in lay hands, do at present claim to be tithe-free: for if a man can show his lands to have been such abbey lands, and also immemorially discharged of tithes by any of the means before-mentioned, this is now a good prescription *de non decimando*. But he must show both these requisites; for abbey-lands, without a special ground of discharge, are not discharged of course; neither will any prescription *de non decimando* avail in total discharge of tithes, unless it relates to such abbey-lands.

The things that are tithable are, for the most part, as follow: corn is a great predial tithe, and tithable according to the custom of the place, commonly by the tenth shock, cock, or sheaf. Beans and pease, expended in the house, are subject to no tithes; but if they are gathered to be sold, or to feed hogs, they are tithable, and are in their nature great tithes. Hay is a predial great tithe, and is to be tithed in swathes or cocks, according to the custom of the place. Clover, rape, and woad, are small tithes: heath, furze, and broom are also tithable. The tithe agistment is a small tithe, and due of common right. Wood is a predial tithe, but whether great or small hath been questioned; but it has been resolved, that if a vicar be only endowed with the small tithes, and has always had tithe-wood, in such case it shall be accounted a small tithe, otherwise it is to be accounted among the great tithes. Timber fit for building of houses and ships, and comprehending oak, elm, and ash, are exempted from tithes, by 45 Edw. III. cap. 3. but timber trees, cut and corded for fuel, have been adjudged to pay tithes, as well as underwood; however, no tithe shall be paid for the roots of trees, for wood cut for husbandry or fuel, for hurdles of sheep, for hop-poles, and for making of bricks, and also fruit trees. When the wood is tithable, it is set out while standing by the tenth acre, pole, or perch; or, when cut down, by the tenth faggot or billet. The tithe of flax and hemp is a small tithe, and by statute this is charged at 5s. per acre, 11 & 12 Will. cap. 16. The tithe of madder is also a small tithe, and charged at 5s. per acre, by 31 Geo. II. cap. 12. The tithe of hops is predial, and reckoned among small tithes; it is not to be paid till after they are picked, and before they are dried, every tenth measure. Out of gardens is paid tithe of all garden herbs and plants, which are small tithes, and may be demanded in kind: potatoes and turnips are also small tithes, as is likewise tobacco and saffron. However, in lieu of the tithes of gardens, a certain consideration in money is paid, either by custom, or by agreement with the parson. Fruits of trees, as apples, pears, plums, cherries, and the like, are predial tithes, to be paid in kind when they are gathered, unless there is some modus, or rate tithe paid in lieu of them. The tenth calf is due to the parson of common right; and if there are seven, he shall have one; if under seven, a halfpenny, or what custom shall direct, for each calf. Colts and pigs are tithable in the same manner as calves; and the time of payment of these tithes is when they are so old that they may be weaned. Wool and lamb are generally reckoned mixed small tithes. Milk is a mixed tithe; where tithe milk is paid in kind, no tithe cheese is due, and where tithe cheese is paid in kind, no tithe milk is due. Deer and conies, being feræ naturæ, are not tithable of common right, but by special custom. Of fowls, which are domestic, as geese, hens, and ducks, tithes are to be paid, either by paying the tenth egg, or the tenth of their young, according to custom. It hath been adjudged, that the paying of thirty eggs in Lent is a good modus for all tithes of eggs. Bees are free of tithes, but the wax and honey are chargeable at the rate of the tenth measure of honey, and the tenth weight of wax. By the books of common law it appears, that some tithe or other is due for a mill. Fish in ponds and private fisheries, and in common rivers, are tithable only by custom. Fish taken in the sea are chargeable by custom as a personal tithe. Personal tithes are regulated by stat. 2 and 3 Edw. VI. cap. 13. but personal tithes are now scarce any where paid in England, unless for mills or fish caught in the sea, and then payable where the party hears divine service, and receives the sacraments. Tithes are recoverable in the spiritual court by the canon law, and by divers statutes, as the statute of circumspecte agatis, 13 Edw. I. st. 4. the statute of articuli cleri, 9 Edw. II. stat. 1. cap. 1. 18 Edw. III. stat. 3. cap. 7. 1 Rich. II. cap. 13, 14. 27 Hen. VIII. cap. 20. 32 Hen. VIII. cap. 7. 2 & 3 Edw. VI. cap. 13. 7 & 8 Will. III. cap. 6. 34. 1 Geo. stat. 2. cap. 6. 27 Geo. II. cap. 20. Tithes in London are subject to particular regulations. By a decree made in 1545, according to the statute 37 Hen. VIII. cap. 12, it is ordered, that the citizens and inhabitants of London and its liberties shall yearly pay their tithes to the parsons, vicars, and curates, after the rate of 16½d. for every 10s. annual rent, and 2s. 9d. for every 20s. rent, and so above the rent of 20s. by the year, ascending from 10s. to 10s. according to the said rate. The wife, children, servants, or others of their family, taking the rites of the church at Easter, shall pay 2d. for their four offering days yearly, &c. Notwithstanding the settlement of this decree, divers prescriptions for the payment of lesser rates than the parsons might require by it (as to pay 10s. for the tithe of a house, although its rent was 40l. a year, or more) have been gained and allowed. But by 22 & 23 Ch. II. cap. 15. after the fire of London, annual certain tithes, or sums of money in lieu of tithes, for fifty-one churches were appointed to be raised by assessments, in the manner prescribed by the said act. For the stipends of the ministers of the fifty new churches, provision is made by the several acts of parliament relating to them, to be raised from the duties on coals. There are also particular statutes for particular churches, in London and in other places.

Original and History of Tithes.—The custom of giving or paying tithe is very ancient; in Gen. xiv. 20. Abraham gives Melchisedech the tenth of all the spoils he had taken from the four kings he had defeated: in Gen. xxviii. 22. Jacob makes a vow at Bethel, to give the tenth of all the riches he shall gather in that sojourn, to God.

But these tithes were free and voluntary, and, besides, differed in divers other respects from what was afterwards called tithe: what Melchisedech received was only the tenth of the spoils, not of Abraham's possessions; and this once, not annually; and beside, not as maintenance, which Melchisedech wanted not, but as homage: add, that this was only from one priest to another; for Abraham had not only a priest in his loins, but was a priest himself. And as to Jacob, who was also a priest, what he did was the effect of a vow, voluntarily taken, to offer the tenth of all he should possess; not to any other priest, but to God himself upon an altar.

Tithe was first legally enjoined by Moses, Lev. xxvii. 30. Numb. xviii. 21. Deut. xiv. 22. That legislator obliged the Israelites to the payment of several kinds of tithes; as, 1. The first tithe מעשר הראשן, which was a tithe of all the fruits given to the Levites: this was not taken till after the oblation called תרומה, *terumah*, which was a tenth part allotted to the priests, had been made.

2. The second tithe was a tenth part of the nine remaining after payment of the first tithe. This tithe was set apart in each family; and the master of the family was obliged to carry it to Jerusalem, and to use it there; or, in case he could not, he was to redeem it, or convert it into money: in which case he was to add a fifth to it, and carry the money to Jerusalem.

3. The tithe of the tithe, was the tenth part of all the tithes that had been given to the Levites by the people: for the Levites, after they had got all their tithes of the people, divided the whole into ten parts; and in their turn gave a tithe to the priests.

4. The tithe of the third year was another kind of tithe, not much different from the second tithe, excepting that it was less troublesome; because they did not carry it to Jerusalem, either in kind, or in money, but kept it by them to be spent by the Levites, the strangers, the fatherless, and the widows of the place, Deut. xiv. 28, 29. This was also called the tithe of the poor, and the third tithe; and these third years when it was paid, were called the tithe years. Several learned Jews and Christians, however, conceive that this was not a distinct tithe, but the same as the second; so that, as Mr. Mede apprehends, what was wont in other years to be spent in feasting, was every third year spent upon the poor. All these tithes are calculated to amount to above one-sixth of the revenue of each person.

These matters are all farther explained in the Talmud, wherein are two books on tithes, also in the book of benedictions, ברכית, in the commentaries of Bartenora, Maimonides, R. Schelomoh Jarrhi, in Scaliger, Amama, Selden, Frischmuth, Quensted, Varenius, Hottinger, Sigonius, Cunæus, Godwyn, Leidecker, &c.

Under the new law tithes are not established by Jesus Christ, or Christian dispensation, as they were under the old law by the ministry of Moses: the Christian priests, and the ministers of the altar of the new covenant, lived, at first, wholly of the alms and oblations of the devout.

In after-times the laity gave a certain portion of their revenues to the clergy, but voluntarily, and not out of any constraint or obligation; the first instances we have of this, are in the fourth and fifth centuries.

This gift was called tithe, not that it was really a tenth part of their income, or near so much: but only in imitation of the tithes of the old law.

In the following age, the prelates in their councils, in concert with the princes, made an express law to the purpose; and obliged the laity to give a full tenth part of their revenues, their fruits, &c. to the ecclesiastics.

This the church enjoyed without disturbance for two or three centuries; but in the eighth century the laity got hold of part of these tithes, either by their own authority, or by grants and donations of the princes; and appropriated them to their own uses.

Some time afterwards they restored them, or applied them to the founding of monasteries or chapters, and the church consented, at least tacitly, to this restitution. In 1179, the third council of Lateran, held under Alexander III. commanded the laymen to restore all the tithes they yet held to the church.

In 1215, the fourth council of Lateran, held under Innocent III. moderated the matter a little; and, without saying any thing of the tithes which the laity already possessed, forbad them to appropriate or take any more for the future.

We may observe, that, upon the first introduction of tithes, though every man was obliged to pay tithes in general, yet he might give them to what priests he pleased, which were called arbitrary consecrations of tithes: or he might pay them into the hands of the bishop, who distributed among his diocesan clergy the revenues of the church, which were then in common. But when dioceses were divided into parishes, the tithes of each parish were allotted to its own particular minister; first by common consent, or the appointments of lords of manors, and afterwards by the written law of the land. However, arbitrary consecrations of tithes took place again afterwards, and became in general use with us till the time of king John. This was probably owing to the intrigues of the regular clergy, or monks of the Benedictine and other rules, and will account for the number and riches of the monasteries and religious houses, which were founded in those days, and which were frequently endowed with tithes. But, in process of years, the income of the laborious parish priests being scandalously reduced by these arbitrary consecrations of tithes, it was remedied by pope Innocent III. about the year 1200, in a decretal epistle, sent to the archbishop of Canterbury, and dated from the palace of Lateran, which enjoined the payment of tithes to the parsons of the respective parishes, where every man inhabited, agreeably to what was afterwards directed by the same pope in other countries. This epistle, being reasonable and just, and correspondent to the ancient law, was allowed of, and became *lex terræ*. This put an effectual stop to all the arbitrary consecrations of tithes; except some footsteps which still continue in those portions of tithes, which the parson of one parish hath, though rarely, a right to claim in another: for it is now universally held, that tithes are due, of common right, to the parson of the parish, unless there be a special exemption. This parson of the parish may be either the actual incumbent, or else the appropriator of the benefice: appropriations being a method of endowing monasteries, which seems to have been devised by the regular clergy, by way of substitution to arbitrary consecrations of tithes.

Father Paolo, in his treatise of beneficiary matters, is of opinion, that the custom of paying tithes, under the new law, began in France; and affirms, that there are no instances of it before the eighth and ninth centuries: but he must be mistaken; for in the second council of Matiscona, held in 585, it is said expressly, that the Christians had a long time kept inviolate that law of God, whereby tithe of all their fruits was enjoined to be given to holy places, &c.

In effect, Origen, hom. xi. on Numb. thinks, that the old laws of Moses, touching the first-fruits and tithes, both of cattle, and of the fruits of the earth, are not abrogated by the gospel; but ought to be observed on their ancient footing.

The fifth canon of the council of Matiscona orders tithe to be paid to the ministers of the church according to the law of God, and the immemorial custom of the Christians, for the use of the poor, and the redemption of captives, and that upon penalty of excommunication: which is the first penalty we find imposed on such as would not pay tithe. On which grounds it is that many among the modern clergy hold their tithes to be *jure divino*.

Others, on the contrary, plead that the recompence to be given church ministers is differently ordained by God, according to the differences he has put between his two great dispensations, the law and the gospel: under the law he gave them tithes; under the gospel, having left all things in his church to charity, and Christian freedom, he has given them only what shall be given them freely, and in charity. That the law of tithes is in force under the gospel, all the protestant divines, except some among the English, deny; for though hire to the labourer be of moral and perpetual right, yet that special kind of hire, the tenth, can be of no right or necessity, but to the special labour for which God ordained it: that special labour was the Levitical and ceremonial service of the tabernacle, Numb. xviii. 21, 31, which was abolished: the right, therefore, of the special hire must be abolished too.

That tithes were ceremonial, is evident from their not being given to the Levites till they had been first offered as an heave-offering to the Lord, ver. 24, 28.

He, then, who by the law brings tithes into the gospel, brings in likewise a sacrifice, and an altar; without which, tithes, by the law, were unsanctified and polluted, ver. 32. And therefore they were never thought of in the first Christian times, till ceremonial altars and oblations had been brought back.

The Jews themselves, ever since their temple was destroyed, though they have rabbies, and teachers of the law, yet pay no tithes, as having no proper Levites to whom, nor any altar whereupon to hallow them; which argues, that the Jews themselves never looked on tithes as moral, but merely ceremonial. Add, that tithes were not allowed to the priests and Levites merely for their labour in the tabernacle; but in consideration of this likewise, that they were not allowed to have any other part or inheritance in the land, ver. 20, 24, and, by that means, for a tenth, lost a twelfth.

Besides, it has been urged, that the priests and Levites were properly the officers and ministers of state under God, as king of Israel; and the Israelites paying through their hands one-tenth to him, was agreeable to the custom of almost all nations to pay one-tenth to their king. Tithes, therefore, are to be considered as an appendage to the theocracy, and it has been said, that it will be extremely difficult to prove, that Christian ministers have a divine right to demand them, from this circumstance of a constitution peculiar to the Jewish nation. As to the original of tithes, judge Blackstone observes, that he will not put the title of the clergy to them upon any divine right; though such a right certainly commenced, and, as he apprehends, as certainly ceased, with the Jewish theocracy; yet an honourable and competent maintenance for the ministers of the gospel is, undoubtedly, *jure divino*; whatever the particular mode of that maintenance may be. Accordingly all municipal laws have provided a liberal and decent maintenance for their national priests or clergy: ours in particular have established this of tithes, probably in imitation of the Jewish law; and perhaps, considering the degenerate state of the world in general, it may be more beneficial to the English clergy to found their title on the law of the land, than upon any divine right whatsoever, unacknowledged and unsupported by temporal sanctions.—But however beneficial this appointment may be to the clergy, it has been complained of as impolitic in a variety of respects, and peculiarly burthensome to the state. It is a great discouragement to the improvement of land, that a tenth part of the clear produce, without any deduction for the advanced expence of raising that produce, should be alienated from the cultivator of the land to any other person whatever. Some have proposed, as a better method for raising a revenue for the clergy, to lay an equivalent tax upon all estates, cultivated or not cultivated. It is well known, and has often been lamented, even by the clergy themselves, that this method of raising a revenue for their subsistence is a continual source of dispute between the clergy and their parishioners, and contributes to obstruct the usefulness of their ministry. In Holland, and some other Protestant countries, the civil magistrates have adopted what some have thought a better plan, by allowing their ministers a fixed stipend, paid out of the public funds.

In effect, for the first three hundred years after Christ, no mention is made in all ecclesiastical history of any such thing as tithes; though, in that time, altars and oblations had been recalled, and the church had greatly judaized in many other things. The churchmen confessedly lived all that time on free-will offerings: nor could the defect of paying tithe be owing to this, that there were wanting civil magistrates to enjoin it; since Christians, having lands, might have given out of them what they pleased; and the first Christian emperors, who did all things by advice of the bishops, supplied what was wanting to the clergy, not out of tithes, which were never proposed, but out of their own imperial revenues.

The first authority produced, setting aside the apostolical constitutions, which few of the patrons of tithes will insist on, is a provincial synod at Cullen in 356, where tithes are voted to be God's rent: but before that time, divers other abuses and complaints had got ground, as altars, candles at noon, &c. And thus one complaint begot another: as it is certain, that tithes suppose altars.

It is not easy to ascertain the time when tithes were first introduced into this country. About the year 794, Offa, king of the Mercians, made a law, whereby he gave to the church the tithes of all his kingdom, in order, as it is said, to atone for the death of Ethelbert, king of the East Angles, whom, in the preceding year, he had caused to be basely murdered. But that they were paid in England before this time by way of offering, according to the ancient usage and decrees of the church, appears from the canons of Egbert, archbishop of York, about the year 750, and from an epistle of Boniface, archbishop of Mentz, written about the same time to Cuthbert, archbishop of Canterbury, and from the 17th canon of the general council held for the whole kingdom at Chalchuth, in the year 787. But the law of Offa first gave the church a civil right to them in this land by way of property and inheritance, and enabled the clergy to recover them as their legal due, by the coercion of the civil power. However, this establishment of Offa reached no farther than to the kingdom of Mercia, over which he reigned; until Ethelwulph, about sixty years after, enlarged it for the whole realm of England.

Judge Blackstone says, that possibly tithes in this country were cotemporary with the planting of Christianity among the Saxons, by Augustin the monk, about the end of the sixth century. But the first mention of them which he has met with in any written English law, is in a constitutional decree, made in a synod held A.D. 786, wherein the payment of tithes in general is strongly enjoined. This canon or decree, which did not at first bind the laity, was effectually confirmed by two kingdoms of the heptarchy, in their parliamentary conventions of estates, respectively consisting of the kings of Mercia and Northumberland, the bishops, dukes, senators, and people. This was a few years later than the time when Charlemagne established the payment of them in France, A.D. 778, and made the famous division of them into four parts; one to maintain the edifice of the church, the second to support the poor, the third the bishop, and the fourth the parochial clergy.

The next authentic mention of them is in the Fœdus Edwardi et Guthruni, or the laws agreed upon between king Guthrun the Dane, and Alfred and his son Edward the elder, successive kings of England, about the year 900. This treaty may be found at large in the Anglo-Saxon laws, and it not only enjoins the payment of tithes, but adds a penalty upon non-observance; which law is seconded by the laws of Athelstan (cap. i.) about the year 930. This, he says, is as much as can be certainly traced out, with regard to their legal original.

The custom of paying tithe, or of offering a tenth of what a man enjoys, or of what he reaps from it, has not only been practised under the old and the new law, but we also find something like it among the heathens.

Xenophon, in the fifth book of the expedition of Cyrus, gives us an inscription upon a column near the temple of Diana, whereby the people were warned to offer the tenth part of their revenues every year to that goddess.

The Babylonians and Egyptians gave their kings a tenth of their revenues: see Aristotle in his Œconomics, lib. ii. Diodorus Siculus, lib. v. and Strabo, lib. xv.—Afterwards the Romans exacted of the Sicilians a tenth of the corn they reaped; and Appian tells us, that those who broke up, or tilled, any new grounds, were obliged to carry a tenth of their produce to the treasury.

The Romans offered a tenth of all they took from their enemies, to the gods; whence the name of Jupiter Prædator: the Gauls, in like manner, gave a tenth to their god Mars, as we learn in the Commentaries of Cæsar.—And Festus, de Verb. Signif. assures us, that the ancients used to give tithe of every thing to their gods: *Decima quæque veteres diis suis offerebant.*

Authors have been strangely perplexed, to find the original of a custom established among so many people of different manners and religions, to give a tenth to their kings, their gods, or their ministers of religion. Grotius takes it to arise hence, that the number ten is the most known, and the most common, among all nations; by reason of the number of fingers, which is ten. On this account he thinks it is, that the commandments of God were reduced to ten, for people to retain them with greater ease; that the philosophers established ten categories, &c.

Extra-parochial Tithes denote tithes which are not within the compass of any distinct parish. By the canon law, these were to be disposed of at the discretion of the bishop; but by the law of England, all extra-parochial tithes, as in several forests, belong to the king, and may be granted to whom he pleases. Accordingly they have been adjudged to him, not only by several resolutions of law, but also in parliament 18th Edw. I. But extra-parochial wastes and marsh lands, when improved and drained, are by 17th Geo. II. c. 37, to be assessed to all parochial rates in the parish next adjoining.

Impropriated and appropriated Tithes, called also *infeodated tithes,* are those alienated to some temporal or ecclesiastical lord, united to their see, and possessed as secular goods. See APPROPRIATION and IMPROPRIATION.

By the council of Lateran, held under Alexander III. in 1179, the alienation or infeodation of tithes is prohibited for the future: whence all infeodations made since that time are generally held, by the canonists, illegal.

Some attribute the original of these impropriated tithes to Charles Martel; and hold him damned for first giving the revenues of benefices to secular nobles: but Baronius will have this a fable, and refers their origin to the wars in the Holy Land; which is also the opinion of Pasquier.

The tribute, it seems, which the Romans imposed on all the provinces of their empire, was a tenth part of all the fruits: hence several authors observe, that the Franks having conquered the Gauls, and finding the imposition established, they kept it on foot, and gave those tithes in fee to their soldiers: and this, say they, was the origin of infeoffed or impropriated or appropriated tithes. But the truth is, they are not so ancient; nor do we find any mention of them before the reign of Hugh Capet; even the very council of Clemont, held in 1097, as hot as it was in the interests of the church, does not say one word of them; which yet would undoubtedly have made loud complaints of such an usurpation, had it been then known.

Portion of Tithes, denotes tithes which the parson of one parish hath a right to claim in the parish of another. These portions, which might probably, at least in part, have been owing to the lord of a manor's estate extending into districts which are now apportioned into distinct parishes, are in law so distinct from the rectory, that if one who hath them purchases the rectory, the portion is not extinct, but remaineth grantable. The cognizance of these belongs like that of other tithes, to the ecclesiastical court.

TI'THING. *s.* (*tithinga*, law Lat.) 1. *Tithing* is the number or company of ten men with their families knit together in a society, all of them being bound to the king for the peaceable and good behaviour of each of their society: of these companies there was one chief person, who, from his office, was called tithingman (*Cowell*). 2. Tithe; tenth part due to the priest (*Tusser*).

TI'THINGMAN. *s.* (*tithing* and *man.*) A petty peace officer; a constable (*Spenser*).

TITHONIA, in botany, a genus of the class syngenesia, order polygamia frustranea. Receptacle chaffy, convex; seeds crowned with a five-leaved chaff; calyx many-leaved, cylindrical; florets of the ray three-toothed. One species only; a native of Vera Cruz, with erect, branched stem; pubescent leaves; solitary flowers.

TITIAN, or Titiano, a celebrated painter, born at Cadore in Friuli, 1477. He was placed under Bellino; but he improved himself more by the laudable emulation between him and his fellow pupil Giorgione than by the instruction of his master. His abilities soon recommended him. He was patronized by Charles V. who knighted him, and bestowed on him several handsome presents as a mark of his esteem, and not for his pictures, which he declared to be above any price. He died at Venice of the plague, 1576, aged 99. His character as a man as well as a painter was so universally respected, that he received the strongest marks of friendship from the greatest and most eminent persons in Europe. His pieces are much admired for their colouring, delicacy, and correctness. The best are, a last supper in the Escurial—a Christ crowned with thorns at Milan—and a portrait of himself, with his mistress combing her hair, in the Paris collection. He left two sons, one of whom, Horatio, was a painter, till allured by the hopes of discovering the philosopher's stone, he applied to chemistry, and died of the plague with his father. Titian's brother Francesco, was also a painter, and made cabinets of ebony adorned with figures, &c.

TITHYMALUS. (τιθυμαλος, a dog, from τιθος, and μαλος, tender; so called from its smooth leaves and milky juice.) Spurge. Two plants are directed for medicinal purposes by this name. See Tithymalus paralias and Esula minor.

Tithymalus cyparissius. See Esula minor.

Tithymalus paralias. Sea spurge. Every part of this plant, euphorbia paralias of Linnéus, is violently cathartic and irritating, inflaming the mouth and fauces. It is never employed in the practice of this country; but where it is used vinegar is recommended to correct its irritating power. See Euphorbia.

To **TI'TILLATE.** *v. n.* (*titillo*, Latin.) To tickle (*Pope*).

TITILLA'TION. *s.* (*titillation*, Fr. *titillatio*, Lat. from *titillate.*) 1. The act of tickling (*Bacon*). 2. The state of being tickled (*Arbuthnot*). 3. Any slight or petty pleasure (*Glanville*).

TITLARK, in ornithology. See Alauda.

TI'TLE. *s.* (*titulus*, Latin.) 1. A general head comprising particulars (*Hale*). 2. An appellation of honour (*Milton*). 3. A name; an appellation (*Shakspeare*). 4. The first page of a book, telling its name, and generally its subject (*Swift*). 5. A claim of right (*South*).

To Ti'tle. *v. a.* (from the noun.) To entitle; to name; to call (*Milton*).

Title, an appellation of dignity or rank given to princes and persons of distinction. Titles were not so common among the ancient Greeks and Romans as they are in modern times. Till the reign of Constantine the title of illustrious was never given except to those who were distinguished in arms or letters: but at length it became hereditary in the families of princes, and every son of a prince was illustrious. The title of highness was formerly given only to kings. The kings of England before the reign of Henry VIII. were addressed by the title of your grace. That monarch first assumed the title of highness, and afterwards that of majesty. The title of majesty was first given him by Francis I. in their interview in 1520. Charles V. was the first king of Spain who assumed the same title.

Princes, nobles, and clergy, generally have one title derived from their territories and estates, and another derived from their rank or from some other remarkable circumstance. The pope is called the bishop of Rome, and has the title of holiness. A cardinal has his name generally from some church, and is saluted by the name of eminent, or most eminent. An archbishop, besides being named from his diocese, is called his grace and most reverend: a bishop is also distinguished by the name of his diocese, and has the title of his lordship and right reverend. Inferior clergymen are denominated reverend.

The titles of crowned heads derived from their dominions it is unnecessary to notice. It will be sufficient to mention those by which they are or have been addressed. To an emperor is given the title of imperial majesty; to kings, that of majesty; to the princes of Great Britain, royal highness; to those of Spain, infant; to electors, electoral highness; to the grand duke of Tuscany, most serene highness; to the other princes of Italy and Germany, highness; to the doge of Venice, most serene prince; to the grand-master of Malta, eminence; to nuncios and ambassadors of crowned heads, excellency; to dukes, grace; to marquisses, earls, and barons, lordship.

The emperor of China, among his titles, takes that of *tien su*, son of heaven. The Orientals, it is observed, are exceedingly fond of titles: the simple governor of Schiras, for instance, after a pompous enumeration of qualities, lordships, &c. adds the titles of flower of courtesy, nutmeg of consolation, and rose of delight.

Title, in law, denotes any right which a person has to the possession of a thing, or an authentic instrument whereby he can prove his right. See the articles Right, Property, &c.

TI'TLELESS. *a.* (from *title.*) Wanting a name or appellation: not in use (*Shakspeare*).

TI'TLEPAGE. *s.* (*title* and *page.*) The page containing the title of a book (*Dryden*).

TITMOUSE, in ornithology. See Parus.

To TI'TTER. *v. n.* (formed, Johnson supposes, from the sound.) To laugh with restraint; to laugh without much noise (*Pope*).

Ti'tter. *s.* (from the verb.) A restrained laugh.

TI'TTLE. *s.* (Johnson says, from *tit.*) A small particle; a point; a dot (*Swift*).

TI'TTLETATTLE. *s.* (formed from *tattle* by a ludicrous reduplication.) Idle talk; prattle; empty gabble (*Prior*).

To Ti'ttletattle. *v. n.* (from *tattle.*) To prate idly (*Sidney*).

TITUBA'TION. *s.* (*titubo*, Lat.) The act of stumbling.

TI'TULAR. *a.* (*titulaire*, Fr.) Nominal; having or conferring only the title (*Bacon*).

TITULA'RITY. *s.* (from *titular.*) The state of being titular (*Brown*).

TI'TULARY. *a.* (*titulaire*, French.) 1. Consisting in a title (*Bacon*). 2. Relating to a title (*Bacon*).

Ti'tulary. *s.* (from the adj.) One that has a title or right (*Ayliffe*).

TITUS VESPASIANUS, son of Vespasian and Flavia Domitilla, became known by his valour in the Roman armies, particularly at the siege of Jerusalem. In the 79th year of the Christian era, he was invested with the imperial purple. While in the house of Vespasian, Titus had been distinguished for his extravagance and incontinence. From such a private character what could be expected but tyranny and oppression? Yet Titus became a model of virtue. When raised to the throne, he thought himself bound to be the father of his people, the guardian of virtue, and the patron of liberty. All informers were banished from his presence, and even severely punished, and a reform was made in the judicial proceedings. To do good to his subjects was the ambition of Titus, and it was at the recollection that he had done no service, or granted no favour one day, that he exclaimed in the memorable words of "My friends, I have lost a day!" Two of the senators conspired against his life, but the emperor disregarded their attempts, he made them his friends by kindness, and like another Nerva, presented them with a sword to destroy him. During his reign, Rome was three days on fire, the towns of Campania were destroyed by an eruption of Vesuvius, and the empire was visited by a pestilence. In this public calamity, the emperor's philanthropy was conspicuous. Titus comforted the afflicted as a father, he alleviated their distresses by his liberal bounties. The Romans, however, had not long to enjoy the favours of a magnificent prince, Titus was taken ill, as he retired into the country to his father's house, and died the 13th of September, A. D. 81, in the 41st year of his age, after a reign of two years, two months, and 20 days. Upon the news of his death, Rome was filled with tears, and all looked upon themselves as deprived of the most benevolent of fathers. After him Domitian ascended the throne, not without incurring the suspicion of having hastened his brother's end.

Titus, a disciple of St. Paul, was a Greek by birth, and on his conversion became an occasional amanuensis to that apostle, who made him bishop of Crete, and wrote an epistle to him, which is extant in the sacred canon. Titus died in that island, at an advanced age.

TITYUS, a celebrated giant, son of Terra; or, according to others, of Jupiter, by Elara, the daughter of Orchomenos. He was of such a prodigious size, that his mother died in travail at his birth. Tityus attempted to offer violence to Latona, but the goddess delivered herself by calling to her assistance her children, who killed him with their arrows. He was placed in hell, where vultures perpetually fed upon his entrails, which grew as soon as devoured. It is said that Tityus covered nine acres when stretched on the ground.

TIVERTON, a borough in Devonshire, with a market on Tuesday. It is seated on the Ex, over which is a stone bridge, is governed by a mayor, and sends two members to parliament. It has a noble free-school (founded by a clothier of this town), which has an endowment also for the maintenance of eight scholars at Baliol college, Oxford, and Sidney Sussex college, Cambridge. Tiverton has suffered very severely by fire, particularly in 1598, 1612, 1731, and 1794. This town has been noted for its great woollen manufacture, and is 14 miles N.N.E. of Exeter, and 161 W. by S. of London. Lon. 3. 38 W. Lat. 50. 54 N.

TIVIOT HILLS. See Cheviot.

TIVOLI, a celebrated town of Italy, in Campagna di Roma, with a bishop's see. It is now wretchedly poor: but boasts, however, of greater antiquity than Rome itself, being the ancient Tibur, which, Horace says, was founded by a Grecian colony. It was the favourite country residence of the ancient Romans, as Frescati is of the moderns. Near the bottom of the eminence on which Tivoli stands, are the ruins of the vast and magnificent villa built by emperor Adrian. Other illustrious Romans had also their villas here; as Julius Cæsar, Caius Cassius, Augustus, Catullus, Propertius, Mæcenas, &c. Horace is thought to have composed great part of his works in this favourite retreat. Near Tivoli are a celebrated cascade, a temple of Vesta, and another of the sybil Albunea, a magnificent villa belonging to the duke of Modena, called the Villa Estense, and the remarkable lake of Solfatara. Tivoli is seated on the Teverone, 12 miles E.N.E. of Rome, and 15 N.N.E. of Frescati. Lon. 12. 43 E. Lat. 41. 59 N.

TLASCALA, a province of New Spain, in the audience of Mexico; bounded on the N. by Panuco, on the E. by the gulf of Mexico, on the S. by Guaxaca and the Pacific Ocean, and on the W. by the audience of Mexico. In the west part of this province is the mountain of Tlascala, 12 miles in circumference; it is well peopled and cultivated, except on the summit, which is always covered with snow. There are also other mountains, covered with trees, in which are tigers and monkeys.

Tlascala, a town of New Spain, capital of a province of the same name. It is seated on a river, partly on a mountain, and partly on a plain, 82 miles E.S.E. of Mexico. Lon. 99. 22 W. Lat. 19. 30 N.

TLEPOLEMUS, a son of Hercules, born at Argos, left his country after the accidental murder of Licymnius, and retired to Rhodes, where he was chosen king, as being one of the sons of Hercules. He went to the Trojan war with nine ships, and was killed by Sarpedon.

TO. *ad.* (ꞇo, Saxon; *te*, Dutch.) 1. A particle coming between two verbs, and noting the second as the object of the first: *I love* to *read* (*Smalridge*). 2. It notes the intention: as, *she raised a war* to *call me back* (*Dryden*). 3. After an adjective it notes its object: as, *born* to *beg* (*Sandys*). 4. Noting futurity: as, *we are still* to *seek* (*Bentley*). 5. To *and again*. To *and fro*. Backward and forward (*Milton*).

To. *preposition*. 1. Noting motion *toward*; opposed to *from* (*Sidney. Smith*). 2. Noting accord or adaptation: *dance* to *the tune* (*Milton*). 3. Noting address or compellation: as *here's* to *you all* (*Denham*). 4. Noting attention or application (*Dryden*). 5. Noting addition or accumulation: *two* to *two make four* (*Denham*). 6. Noting a state or place whither any one goes: as, *away* to *horse* (*Sh.*). 7. Noting opposition: as, *foot* to *foot* (*Dryd.*). 8. Noting amount: as, to *the number of three hundred* (*Bacon*). 9. Noting proportion: as, *three* to *nine* (*Swift*). 10. Noting possession or appropriation: *he has it* to *himself* (*Felton*). 11. Noting perception: as, *sharp* to *the taste* (*Dryden*). 12. Noting the subject of an affirmation; as, *oath* to *the contrary* (*Shakspeare*). 13. In comparison of (*Tillotson*). 14. As far as (*Arbuthnot*). 15. After an adjective it notes the object: *deaf* to *cries* (*Shakspeare*). 16. Noting obligation: *true* to *his trust* (*Holyday*). 17. Respecting (*Shakspeare*). 18. Noting extent (*Hammond*). 19. Toward (*Dryden*). 20. Noting presence (*Swift*). 21. After a verb, *to* notes the object; *books conduce* to *learning* (*Shakspeare*). 22. Noting the degree: *it was repeated* to *the hundredth time* (*Boyle*).

TOAD, in amphibiology. See Rana.

TOADFISH. See Lophius.

TOADFLAX. See Linaria, and Antirrhinum.

TOADSTONE, in mineralogy, a species of basalt. See Basaltes.

Also a petrifaction from the grinders of the sea-wolf. See Ichthyolithus.

To TOAST. *v. a.* (*tostum*, Latin.) 1. To dry or heat at the fire (*Brown*). 2. To name when a health is drunk (*Prior*).

Toast. *s.* (from the verb.) 1. Bread dried before the fire (*Bacon*). 2. Bread dried and put into liquor (*Pope*). 3. A celebrated woman whose health is often drunk (*Addison*).

TO'ASTER. *s.* (from *toast*.) He who toasts.

TOBACCO, in botany, see Nicotiana tabacum.

The leaves of this plant are peculiarly powerful, both as a medicine and as a local stimulus. As a medicine, we have already had to observe, under the article Poisons, that its influence when introduced into the stomach is almost entirely confined to the action of the heart, while that of the brain, and of every other muscle besides the heart, remains but little affected by its operation. As a local stimulus it constitutes an important article in trade and commerce, and under different manipulations is chewed, smoked, and forms a variety of snuffs.

Tobacco has hence become an object of minute attention to the analyst with a view of ascertaining its constituent principles, and especially that acrid and volatile power which is peculiar to itself, and exists alike under every operation of art. The best paper upon this subject which has yet occurred to us has been published by M. Vauquelin, in vol. lxxi. of the Annales de Chimie; and its importance induces us to transcribe it in our own tongue, in a somewhat abridged form.

He commences by observing that tobacco has been attempted to be made from a variety of other plants besides the nicotiana tabacum, but in vain, since none of them have possessed, or by any combined process been rendered able to give forth the peculiar substance, whatever it be, by which the nicotiana is characterised.

These considerations have led us, he continues, to undertake a careful chemical analysis of the different species of nicotiana employed in manufacturing tobacco, as well as of the tobacco of different manufactories, both French and foreign.

We were of opinion, on entering upon this inquiry, that some advantages might result from it to the manufacturer with respect to the preparation of tobacco; or that at least the theory of chemistry might derive from it some principle, by means of which it could give a satisfactory explanation of the changes that might take place in the matters entering into the composition of tobacco.

I ought here to mention, that I have been assisted in this long and laborious research by Mr. Robiquet, a very well informed young apothecary of Paris, and Mr. Warden, American consul, who devotes the leisure moments afforded him by his office to the practice of chemistry.

After having bruised the leaves of nicotiana latifolia in a marble mortar, we wrapped them in a linen cloth, and subjected them to the action of the press. To separate all the soluble matter they might contain, this operation was repeated three times, with the addition of a little water.

Though the cloth was of a pretty close texture, the juice retained a large quantity of green matter in suspension, which was separated by filtration through blotting paper. The green matter that remained on the filter was washed and set apart, and will be noticed hereafter.

Examination of the filtered juice.—1. This juice strongly reddened litmus paper, a proof that it contained a free acid.

2. Oxalat of ammonia, by the copious precipitate it formed, demonstrated the presence of lime, and consequently of some calcareous salt.

3. Nitrat of silver threw down a copious precipitate, which was not wholly dissolved by nitric acid; whence we may infer, that it was partly formed by a muriat.

4. The infusion of galls, and the mineral acids, indicated, by the tolerably bulky brown precipitates they occasioned, the existence of some animal matter, particularly of albumen.

5. Heat raised to 80° of R. (212° F.) confirmed this by occasioning a copious coagulation.

6. Acetat of lead formed a very copious grayish precipitate, which dissolved in great part in distilled vinegar.

The effect of acetat of lead on this juice inducing us to suspect the presence of malic acid, we precipitated, by means of acetat of lead, a pretty large quantity of the liquor coagulated by heat; and afterward passed through this precipitate, washed and diffused in water, a stream of sulphuretted hydrogen gass, till there was a slight excess of it.

The intention of this was to reduce the lead to a sulphuret, and thus separate it from the matter with which it had been united. To facilitate the precipitation of the sulphuretted lead, we heated the liquor, and filtered.

The liquor thus filtered was cautiously evaporated to the consistence of a syrup. In this state it had a very acid taste, strongly reddened infusion of litmus, and formed with alcohol and ammonia copious sediments, which, while they indicated the presence of animal matter, proved that a portion of it had been carried down with the lead in its precipitation.

Hoping that the acid contained in this thickened liquor would prove soluble in spirit of wine, and that we might thus separate it from the matter it held in solution, we treated it hot with this menstruum at 40° (sp. gr. 0·817). In fact, as soon as the mixture of these two liquors took place, a copious coagulation was produced, and the alcohol became coloured, first yellowish, then brown red, and was found to be acid.

The matter not dissolved by the spirit of wine was whitish, partly dissolved in water, and its solution was precipitated by the acetat of lead like the acid itself.

Oxalat of ammonia occasioned in it a precipitate, and this substance, placed in burning charcoal, left a residuum of carbonat of lime. Lastly, we found, that this substance was formed in great part of malat of lime, which retained some portions of vegeto-animal matter.

The greater part of this vegeto-animal matter, which we had endeavoured to separate by means of alcohol, having dissolved in it by the help of the acid, we saturated the latter with ammonia, which threw down a considerable flocculent sediment, the properties of which were perfectly similar to those of animal matters. Notwithstanding this saturation, nutgalls still produced a very evident precipitate in the liquor; whence we perceive there exists a very great affinity between the acid and this animalized principle.

This acid, purified as much as possible, exhibited all the characters of malic acid; that is, it imparted considerable consistency to water by evaporation, did not crystallize, gave with acetat of lead a precipitate soluble in distilled vinegar, swelled up in the fire giving out a smell of burned sugar, and was converted into oxalic acid by the nitric acid.

Thus the acetat of lead had thrown down at once malic acid, a great deal of coloured vegeto-animal matter, and a little malat of lime. The last appeared to have been carried down in combination with the malat of lead, and to have been redissolved by the malic acid, as fast as it was separated by the sulphuretted hydrogen.

In several experiments, in which we thus precipitated tobacco juice by an excess of acetat of lead, we in like manner found again malat of lime in the malic acid.

A large quantity of malat of lime therefore exists in tobacco, which may be obtained directly by evaporating the juice of the plant to two thirds.

As soon as we had completely ascertained the nature of the acid, we returned to the juice of tobacco into which we had poured an excess of acetat of lead, to treat it also with sulphuretted hydrogen. We had obtained a very transparent liquid, of a lemon colour, which retained the exact smell and all the acrimony of the unaltered juice. Suspecting that this taste depended on a volatile oil, we distilled the liquor, and obtained a product, that had a slight herbaceous smell, and but little taste.

The concentrated portion, that remained in the retort, emitted, on the addition of a little potash or ammonia, a strong smell, which was so pungent, that, if snuffed up with a little force, it occasioned sneezing and tears. We repeated the experiment by adding potash to a more considerable quantity of matter, and distilled, after having diluted it with a little water. The new product, which we obtained in this operation, had the smell of tobacco smoke, was extremely acrid, and produced a similar sensation to that occasioned by a pinch of snuff taken with such force as to get into the throat.

As this product was alkaline, we suspected that this principle, whatever it might be, was rendered volatile only by means of ammonia, arising from the decomposition of an ammoniacal salt in the tobacco; since, when the liquor contained an excess of acid, we did not obtain the same result. However, in a similar process, conducted it is true with dry tobacco, we obtained a product, the smell and taste of which were at least equally striking, though the liquor that yielded it contained a free acid. For the rest, we were never able perfectly to isolate this acrid substance, and even the greater part remained in the retort. Hence it appears, that the malic acid diminishes the volatility of this acrid principle.

In order to obtain this principle separately, we evaporated, by a very gentle heat, the liquor it contained, and treated it with alcohol at 40° (0·817), which in fact separated it from the other matters. On afterward evaporating the alcohol, we remarked at the surface of the liquid some traces of a brown oil; and the portion that distilled over became more and more acrid, as the process approached its conclusion. This nearly solid oil, when thrown on burning coals, emitted a thick smoke, and such a strong smell of tobacco, that it was insupportable.

The alcoholic solution yielded on cooling some nitrat of potash.

The acrid principle in question has little smell when dissolved in water; which shows, that it is not very volatile. It appears very difficult to destroy; for, if it be mixed with a pretty large quantity of oxymuriatic acid, it still retains all its acrimony, after the acid has evaporated spontaneously.

The peculiar degree of volatility and acrid taste of this substance seem to indicate, that it is a principle belonging exclusively to the genus nicotiana; and which is consequently new, since those chemists, who have analysed this plant, have not spoken of it, at least as far as we know.

Hence we may conclude, that this principle, which is found also in prepared tobacco, is not altered by the different operations it undergoes; and consequently is not produced by any change in the constitution of the materials of the plant.

The following are the substances we have thus far found in the juice of tobacco:

1. An animal matter.
2. Malat of lime with excess of acid.
3. Nitrat of potash.
4. Muriat of potash.
5. A peculiar acrid principle.

Now we know these different substances contained in the juice of tobacco coagulated and filtered, we shall point out the results of the successive experiments made on the green fecula, on the coagulum obtained during the boiling of the juice, and on the woody residue.

The green matter obtained by filtering tobacco juice, being treated with alcohol, left as an insoluble residuum a grayish substance, tolerably compact, yielding on distillation a great deal of carbonat of ammonia, partly crystallized and partly dissolved in water, a thick fetid oil, and a coal of difficult incineration, which yielded a little lime, proceeding no doubt from a portion of decomposed malat. It appears, that this matter is a portion of insoluble vegetable albumen. As to the colouring portion of the fecula dissolved by alcohol, it differed in no respect from the green fecula of vegetables.

We have said, that a pretty considerable coagulum was formed on boiling the filtered juice. This coagulum is an albuminous vegeto-animal substance; for it emits the same smell as horn when burning, and yields a great deal of ammonia; but it is remarkable, that it leaves a great deal of lime after it is burned.

To find whence this earth could be derived, we treated a portion of this animal matter with muriatic acid very much diluted. The solution, filtered and saturated with ammonia, yielded by cautious evaporation a granular powder, which was also malat of lime. What had not dissolved in the muriatic acid was pure vegeto-animal matter.

Something remains to be said respecting the woody residuum. After it had been well washed, we treated it with alcohol, to take up all the green resin it contained; and we afterward subjected it to the action of weak nitric acid, which extracted from it various calcareous salts. At first, on saturating this acid by ammonia, we obtained a flocculent matter, which, when decomposed by sulphuric acid, yielded an acid liquor, that precipitated lime water in large flocks, which oxalic acid does not. However, as we suspected the existence of oxalat of lime in this woody residuum, we cautiously evaporated a portion of the same liquor, and obtained a few crystals of oxalic acid.

Phosphat of lime may be pretty accurately separated from oxalat of the same base, when they are dissolved in nitric acid, by adding ammonia to the solution, so that a slight excess of acid shall remain. The oxalat of lime will be precipitated for the most part in a pulverulent form, while the phosphat of lime remains in solution; and this may be precipitated afterward by a larger quantity of ammonia.

The mother water of these crystals, evaporated to dryness and calcined, yielded us phosphoric acid. We also perceived in the nitric solution traces of calcareous salt, which we separated by evaporation of the liquor, and which we found to be malat of lime.

Thus the nitric acid took up malat, phosphat, and oxalat of lime, from the woody residuum.

Lastly, the woody matter, after having been treated by these different agents, left, when burned, some ashes, composed chiefly of silex, with a little lime and iron.

Another process for obtaining the acid principle contained in tobacco leaves.—Instead of precipitating, by means of acetat of lead, the juice of tobacco coagulated by heat, as we have related above, the juice may be evaporated by a gentle heat, and, when reduced to about one-fourth, suffered to cool. It will then deposite a pretty large quantity of malat of lime in granular crystals, which will become opake by exposure to the air. On boiling down the solution still farther, it will yield fresh quantities of the same salt; and lastly, when it has acquired such a consistence as will not allow the saline particles to unite, it is to be treated with alcohol, to dissolve the free malic and acetic acids, the acrid matter, and the sal ammoniac; and to separate the animal matter, which the heat could not coagulate on account of the acids that held it in solution.

The alcohol, containing in solutions the matter just mentioned, is to be evaporated in a retort. It will carry over nothing with it. The liquor remaining in the retort is to be concentrated anew, and treated a second time with highly dephlegmated alcohol, to precipitate some portion of animal matter, that was dissolved in the former operation by means of a little water.

This second portion of alcohol being evaporated in its turn, what remains is to be dissolved in water; the malic and acetic acids are to be saturated accurately with potash; and the whole is to be distilled to dryness, taking care that it does not burn. The water obtained, though clear and colourless, is insupportably acrid; and what is left in the retort still retains the same property: but on redissolving it several times in water, and distilling it, the operator will at length deprive it almost wholly of its acrid taste, and obtain the principle that produces it dissolved in distilled water.

We have not yet satisfactorily ascertained the nature of the matter that accompanies it, and which dissolves with it in the alcohol. This matter has a yellowish red colour; and swells up and is converted into a coal in the fire.

If, after this matter has been divested as far as possible of the acrid principle, the residuum be urged with a stronger heat, an oil will be obtained, and muriat of ammonia will sublime. It likewise yields ammonia from the decomposition of the muriat by the potash of the malat and acetat, which the heat decomposes.

From the experiments here related it follows, that the juice of nicotiana latifolia contains,

1. A large quantity of animal matter of an albuminous nature.
2. Malat of lime with excess of acid.
3. Acetic acid.
4. Nitrat and muriat of potash in notable quantity.
5. A red matter soluble both in alcohol and in water, which swells up considerably in the fire, and of which I do not well know the nature.
6. Muriat of ammonia.
7. Lastly, an acrid, volatile, colourless principle, soluble both in water and in alcohol, and which appears to be different from all that are known in the vegetable kingdom. It is this principle that imparts to prepared tobacco the peculiar character, that renders it easily distinguishable from every other vegetable preparation.

It is possible, however, that this principle may be nothing but a very thin oil, which, on this very account, would possess a certain degree of volatility, and the property of dissolving in water and vegetable acids, as common volatile oils do; for on treating dry prepared leaf tobacco directly with alcohol, we obtained, independently of the acrid principle, a brown oil, that had nearly a similar taste.

It may be conceived, that this matter existed originally in the plant in the state of volatile oil; and that it has been thickened, and in some measure resinified, by the progress of vegetation and desiccation.

It might be supposed too, with equal probability, that the thick oil, of which we have just spoken, is a part of the green resin, that owes its acrid taste to a portion of the volatile principle, which has combined with it. At least there is no doubt that prepared tobacco owes the greater part of its distinguishing properties to the acrid principle and the oil that exist in the leaf of the nicotiana, for these two substances produce the same sensations in the mouth and in the nose as tobacco itself.

In smoking tobacco these sensations are modified by the empyreumatic oil, pyroligneous acid, and ammonia, that are formed during combustion; yet we still distinguish very sensibly those arising from the substances in question.

By passing the tobacco smoke through water, as is done in certain countries, the smell and taste of these two peculiar substances are rendered more mild and agreeable. See farther Tabacum and Nicotiana.

Tobacco anglicum. See Nicotiana minor.

Tobacco (English). See Nicotiana minor.

Tobacco (Virginian). See Nicotiana.

TOBA'CCONIST. *s.* (from *tobacco.*) A preparer and vender of tobacco.

TOBACCO-PIPE. See Pipe.

Tobacco-pipe-fish. See Fistularia.

TOBAGO, the most southern of the islands in the West Indies, and the most eastern except Barbadoes. It is 32 miles long and 10 broad; and near its N.E. extremity is Little Tobago, an island two miles long and one broad. The climate is not so hot as might be expected from its situation so near the equator; nor is it visited by such dreadful hurricanes as frequently desolate the other islands. It is diversified with hills and vales, and is equal in richness of produce to any islands in these seas. In 1748 it was declared a neutral island, but in 1763, was ceded to the English. It was taken by the French in 1781, and confirmed to them in 1783; but it was taken by the English in 1793. restored in 1802, and again taken in 1803. The principal place is Scarborough.

TOBERMORY, a town of Scotland, in the island of Mull, with a good harbour, and a customhouse; seated on a fine bay, near the N.W. end of the sound of Mull. Lon. 5. 58 W. Lat. 56. 46 N.

TOBOLSK, a government of the Russian empire, which comprehends the greatest part of Western Siberia. It is divided into the two provinces of Tobolsk and Tomsk.

Tobolsk, a city of Siberia, capital of the government of Tobolsk (formerly of all Siberia) and an archbishop's see. It is seated on the Irtysh, opposite the influx of the Tobol, and divided into the upper and lower town. The upper town, which is properly the city, stands on a hill, on the E. side of the fort, and is enclosed with an earthen rampart: it has three wooden churches and a convent. In the fort are the governor's house, the archbishop's palace, the exchange, and two churches, which are all stone buildings. The lower town stands on a plain, between the city and river. Most of the houses being constructed of wood, it was nearly consumed by a fire about 1786; but it is now rebuilt, and chiefly of stone. Tobolsk contains 15,000 inhabitants, and almost the fourth part are Tartars, who drive a great trade on the river Irtysh, and carry their goods to China. There are also a great number of Kalmucs. The rest of the inhabitants are Russians, whose ancestors were banished hither for their crimes, or such as are exiles themselves. All the Chinese caravans are obliged to pass through this town; and all the furs furnished by Siberia are brought into a warehouse here, and thence forwarded to the Siberian chancery, at Moscow. Here are many artificers, who want neither tools nor materials to carry on their trades; but, from the cheapness of all the necessaries of life, indolence and sloth prevail to such a degree, that it is difficult to get any thing made. Tobolsk is 1100 miles E. by N. of Moscow, and 1200 E. by S. of Petersburg. Lon. 68. 35 E. Lat. 58. 12 N.

TOCANTIN, the largest river of Brasil, which rises in lat. 18 S. and flows N.E. at the foot of a ridge of mountains, for above 700 miles; then enters a more open country, and pursues its course 400 miles further to the Atlantic ocean, which it enters by a large estuary, below the city of Para. The estuary of this river has a communication with that of the Amazon to the W.; and the space included by them and the ocean is an island, 150 miles in diameter, called Maraso or Joanes.

TOCAT, a city of Asiatic Turkey, in the sangiacate of Sivas. The houses are handsomely built, and the streets paved, which is an uncommon thing in these parts; but the town makes a very odd appearance, being built on uneven ground. There are two rugged perpendicular rocks of marble, with an old castle upon each; and so many streams, that each house has a fountain. The inhabitants are computed at 60,000. There are 12 mosques, and a vast number of chapels; the Armenians have seven churches, and the Greeks only one. The chief trade is in copper vessels, but much yellow leather and silk is manufactured. Tocat may be considered as the centre of trade in Turkey; for caravans come hither from several parts. Its territory abounds in fruit and excellent wine. It is 45 miles W.N.W. of Sivas, and 150 N. of Marash. Lon. 37. 35 E. Lat. 39. 10 N.

TOCAYMA, a town of New Granada, seated on the Pati, in a country abounding in fruit and sugar-canes. Here are hot-baths between two cold springs; and near the town is a volcano. Lon. 73. 50 W. Lat. 4. 3 N.

TOCKAY, a strong town of Upper Hungary, in the county of Zimplin, with a castle. It is celebrated for its excellent wine; but being produced only by one vineyard, it is scarce even at Vienna. At some distance from it are large salt-works. It is seated at the confluence of the Bodrog and Teisse, 75 miles N.W. of Great Waradin, and 90 N.E. of Buda. Lon. 21. 25 E. Lat. 48. 10 N.

TOD. *s.* (*totte haar*, a lock of hair, Germ.) 1. A bush; a thick shrub: obsolete (*Spenser*). 2. A certain weight of wool, twenty-eight pounds (*Shakspeare*).

TODUS. Tody. In zoology, a genus of the class aves, order picæ. Bill subulate, depressed, obtuse, straight, covered at the base with bristles; nostrils oval, small; feet gressorial. Sixteen species. These mostly inhabit the warmer parts of America; are very nearly allied to the genus muscicapa, but are distinguished by their having the middle and outer toe much connected, which in the fly-catchers (muscicapæ) are divided to the base.

The green tody (todus viridis) is best known and most esteemed. Sloane, who first described it, proposed to call it the green sparrow or green humming-bird. Its size is that of a wren, being scarcely four inches in length. It is easily distinguished by its red bill, and the light blue colour of its back. The belly is white, the throat and sides a beautiful rose-colour. The upper parts of the body are green, in the female; in the male blue.

The claws are long and hooked, for scooping out the hole in the ground where it takes up its abode and builds its nest. This subterraneous dwelling it renders comfortable, by its being lined with straw, moss, cotton and feathers. The eggs are of a grey colour, with spots of a deep yellow; and the young, when excluded, are fed with insects and small worms. In St. Domingo, this species is known by the name of the ground parakeet.

TODY, in ornithology. See Todus.

TOES. Digiti pedi. The fingers of the feet. They consist of three distinct bones disposed in rows called phalanges, or ranks of the toes. The great toe has but two phalanges; the others have three ranks of bones, which have nothing particular, only the joints are made round and free, formed by a round head on one bone, and by a pretty deep hollow for receiving it, in the one above it.

TOFIELDIA, in botany, a genus of the class hexandria, order trigynia. Calyx three-cleft; petals six; style vertical, short; capsules three, superior, united at the base, many-seeded; anthers roundish. One species only, tofieldia palustris, Scottish asphodal, found in the bogs of North Britain.

TOFO'RE. *ad.* (ꞇoꝼoꞃan, Saxon.) Before: obsolete (*Shakspeare*).

TOFT. *s.* (*toftum*, law Lat.) A place where a messuage has stood (*Cowell*).

TO'GED. *a.* (*togatus*, Latin.) Gowned; dressed in gowns (*Shakspeare*).

TOGE'THER. *ad.* (ꞇoᵹæðeꞃe, Saxon.) 1. In company (*Milton*). 2. Not apart; not in separation (*Bacon*). 3. In the same place (*Davies*). 4. In the same time (*Dryden*). 5. Without intermission (*Dryden*). 6. In concert (*Addison*). 7. In continuity (*Milton*). 8. Together *with.* In union with; in a state of mixture with (*Dryden*).

TOGGENBURG, a county of Switzerland, depending on the abbey of St. Gallen. It is a narrow country, situate between high mountains, is fertile in corn and fruit, and is divided into the Upper and Lower. It contains 30 parishes, and upwards of 46,000 inhabitants. There are more protestants than catholics, but both religions are bound by oath to maintain reciprocal harmony.

To **TOIL.** *v. n.* (ꞇılıan, Sax. *tuylen*, Dut.) To labour; perhaps originally, to labour in tillage (*Prior*).

To Toil. *v. a.* 1. To labour; to work at (*Milton*). 2. To weary; to overlabour (*Sh.*).

Toil. *s.* (from the verb.) 1. Labour; fatigue (*Milton*). 2. (*toile, toiles*, Fr.) Any net or snare woven or meshed (*Denham*).

TOI'LET. *s.* (*toilette*, Fr.) A dressing table (*Pope*).

TOI'LSOME. *a.* (from *toil.*) Laborious; weary (*Pope*).

TOI'LSOMENESS. *s.* (from *toilsome.*) Wearisomeness; laboriousness.

TOISE is a French measure, containing six feet, or a fathom; a square toise is thirty-six square. The toise and the fathom correspond in the division of the feet; but these divisions being unequal, it is necessary to observe that the proportion of the yard, as fixed by the Royal Society at London, to the half toise as fixed by the Royal Academy at Paris, is as 1000 to 1065.

TOKAY-WINE, derives its name from a town of Hungary, where it is produced. There are four sorts of wine made from the same grapes, distinguished at Tokay by the names of essence, auspruch, masslach, and the common wine. The essence is made by picking out the half-dried and shrivelled grapes, and putting them into a perforated vessel, where they remain as long as any juice runs off by the mere pressure of their own weight. This is put into small casks. The auspruch is made by pouring the expressed juice of the grapes from which the former had been picked on those that yielded the essence, and treading them with the feet. The liquor thus obtained stands for a day or two to ferment, and then is poured into small casks, which are kept in the air for about a month, and afterwards put into casks. The same process is again repeated by the addition of more juice to the grapes which have already undergone the two former pressures, and they are now wrung with the hands; and thus is had the masslach. The fourth kind is made by taking all the grapes together at first, and submitting them to the greatest pressure: this is chiefly prepared by the peasants. The essence is thick, and very sweet and luscious: it is chiefly used to mix with the other kinds. The auspruch is the wine commonly exported, and which is known in foreign countries by the name of Tokay.

The goodness of it is determined by the following rules. The colour should neither be reddish nor very pale, but a light silver: in trying it, the palate and tip of the tongue should be wetted without swallowing it, and if it manifest any acrimony to the tongue, it is not good; but the taste ought to be soft and mild: when poured out, it should form globules in the glass, and have an oily appearance: when genuine, the strongest is always of the best quality: when swallowed, it should have an earthy astringent taste in the mouth, which is called the taste of the root. All tokay wine has an aromatic taste, which distinguishes it from every other species of wine. It keeps to any age, and improves by time: but is never good till about three years old. It is the best way to transport it in casks; for when it is on the seas, it ferments three times every season, and thus refines itself. When in bottles, there must be an empty space left between the wine and the cork, otherwise it would burst the bottle. A little oil is put upon the surface, and a piece of bladder tied over the cork. The bottles are always laid on their sides in sand. Philosophical Transactions, vol. lxiii. part. ii. p. 292, &c.

TO'KEN. *s.* (ꞇacn, Saxon; *teycken*, Dut.) 1. A sign (*Psalms*). 2. A mark (*South*). 3. A memorial of friendship; an evidence of remembrance (*Drayton*).

To TO'KEN. *v. a.* (from the noun.) To make known: not in use (*Shakspeare*).

TOLD. (pret. and part. pass. of *tell.*) Mentioned; related (*Milton*).

To TOLE. *v. a.* To train; to draw by degrees (*Locke*).

TOLEDO, a city of Spain in New Castile, of which it was formerly the capital. It is seated on a conical hill on the river Tajo, which nearly surrounds it; and on the land side is an ancient wall, flanked with 100 towers. There are a great number of superb structures, beside 17 public squares, where the markets are kept. It is an archbishop's see; and the cathedral is the richest in Spain: the Segrario, or principal chapel, contains 15 large cabinets let into the wall, full of gold and silver vessels, and other works. Here are 38 religious houses, with a great number of churches belonging to 27 parishes, and some hospitals. The inhabitants, once estimated at 200,000, are now reduced to 25,000. Without the town are the remains of an amphitheatre, and other antiquities. It has a royal castle, a famous university, and several manufactures of arms, silk, and wool. It is 37 miles S. of Madrid. Lon. 3. 20 W. Lat. 39. 50 N.

TOLEN, a fortified town of Holland, in Zealand, in an island of the same name, separated by a narrow channel from Brabant. On the Brabant side it has a fort called Schlyckenburg, five miles N.W. of Bergen op Zoom. Lon. 4. 20 E. Lat. 51. 30 N.

TO'LERABLE. *a.* (*tolerable*, Fr. *tolerabilis*, Lat.) 1. Supportable; that may be endured or supported (*Hooker*). 2. Not excellent; not contemptible; passable (*Swift*).

TO'LERABLENESS. *s.* (from *tolerable.*) The state of being tolerable.

TO'LERABLY. *ad.* (from *tolerable.*) 1. Supportably; in a manner that may be endured. 2. Passably; neither well nor ill; moderately well (*Woodward*).

TO'LERANCE. *s.* (*tolerantia*, Latin.) Power of enduring; act of enduring (*Bacon*).

To TO'LERATE. *v. a.* (*tolero*, Lat. *tolerer*, Fr.) To allow so as not to hinder; to suffer; to pass uncensured (*Hooker*).

TOLERA'TION. *s.* (*tolero*, Latin.) Allowance given to that which is not approved (*South*).

TOLERATION, in religion, a term which has made a great figure in the disputes among protestants, who have been exceedingly divided about the measures of toleration, or the degrees to which reputed heretics and schismatics are, or are not, to be suffered.

Many of the church of England have zealously opposed the toleration of presbytery, &c. nor has the church of Scotland been behind-hand with them in their zeal against episcopacy.

But all who have reasoned consistently from the principles of the reformation, have been for toleration; as well perceiving they had no right to oblige any body to follow their particular sentiments; but the difficulty is, the setting of bounds to this toleration.

M. Basnage, and some others, distinguish civil toleration from ecclesiastical. The latter allows of different, and even opposite sentiments in the church; and the first permits them in civil society.

By civil toleration, is meant impunity and safety in the state for every sect which does not maintain any doctrine inconsistent with the peace and welfare of the state. This civil, or political toleration, implies a right of enjoying the benefit of the laws, and of all the privileges of the society, without any regard to difference of religion.

Ecclesiastical toleration is an allowance of certain opinions, which, not being fundamentals, do not hinder those who profess them from being esteemed members of the church. But as to the quality and number of these fundamental points, they never could, nor in all probability ever will be agreed upon.

In order to discover the genuine principles of toleration, it is necessary to consider that, antecedently to the formation of civil societies, mankind possess certain rights, independent of all human grant, not derived from any compact, and which are therefore to be acknowledged as the rights of human nature. A right to judge for themselves in points of religion is one of these rights; which, whilst it authorizes every individual to claim the exercise of this privilege to himself, obliges him to allow it in the same extent to all about him, and establishes one uniform regulation for his behaviour toward others, and their behaviour toward him: e. g. no apprehensions of the truth and certainty of any person's religious sentiments can justify him in attempting to impose them on his neighbour; for the same right of judgment, which any one can claim, belongs, on the same principle, equally to all, and ought to be equally sacred and inviolable in all; and no reason can be alleged by him for taking the religious liberty of others from them, but what will, at the same time, equally destroy his own title to it.

The injustice of similar encroachments upon him from others follows from the same principle, and with the same evidence.

Whether the claim of such a liberty of judgment in religion for ourselves is weakened by men's entering into civil society, is the next object of consideration.

The great end of government is to protect the subjects of it from the injuries to which they were exposed in a state of nature; and as all injuries imply rights of which they are violations, and the care taken to guard against the violation of these rights is an acknowledgment of the reality and importance of them; it evidently follows, that when they enter into society, if the primary and leading view of government be to prevent or restrain those injuries, to which men were exposed for want of its protection, they carry these rights with them; that they continue to retain them; and that, instead of supposing themselves to be deprived of them, the very design with which they put themselves under the authority of government is to secure them the more firmly. With this view they entrust the preservation of them to common guardians, by whose intervention, it is presumed, they will be more vigorously asserted, and more effectually protected, than it is possible they should be in a state where there is no common umpire to check the evils of oppression on the one hand, and restrain the no less formidable evils of immoderate resentment on the other.

If we consider what are the rights which men give up to government, when they enter into civil societies, they will be found to be, not those which may most properly be styled the primary rights of human nature; not the right which every man has to live undisturbed, to enjoy the advantages which he justly possesses, and to be left to his freedom in all things not injurious to his fellow-creatures; but the consequential, though equally real and certain right which, where men are not subject to government, every person has to take the assertion of all his rights into his own hands, and correct the infringers of them by the inflicting of such pains, or the use of such other methods of deterring the authors of the wrong, as reason shall warrant for his future security: and, speaking precisely, even these rights are not absolutely extinguished and utterly lost, but suspended by such limitations as the order and well-being of society require, and so long as the succours of government shall be effectual. The primary rights of liberty, safety, and protection from oppression, still subsist in their full vigour. To suppose them abandoned, renounced, and annihilated, or that government can have any right to destroy them, is ascribing to it a right to defeat the end for which it is established, and betray the trust reposed in it. It is, indeed, totally inverting the principle upon which the power of rulers stands, and by which the acts of it ought to be guided.

Man was not made for government, but government for man; and the great object, to which all the operations of it should be directed, is to guard, as much as possible, the equal, impartial ease and freedom of all the subjects of it. To this purpose judge Blackstone observes, that the principal aim of society is to protect individuals in the enjoyment of those absolute rights, which were vested in them by the immutable laws of nature, but which could not be preserved in peace without that mutual assistance and intercourse, which are gained by the institution of friendly and civil communities: so that the primary end of human laws is to maintain and regulate these absolute rights of individuals. See GOVERNMENT, and CIVIL LIBERTY.

Now, of all the rights inherent in human nature, that of thinking for ourselves, and following the conviction of our own judgments in relation to the object of our faith, worship, and religious obedience, is the most sacred, incontestable, and in every view of it, intitled to the most careful protection. The preservation of these is one of the chief, perhaps the first end for which civil societies are instituted, and the rulers of them invested with power: and therefore, in all governments, the rights of conscience should have a principal place assigned them in the care of those to whom the protection of their fellow-creatures is committed. If the securing of equal, impartial liberty, in all those instances of it in which it is not injurious to others, be so much the object of every equitable, wise, and well-constituted system of laws, that all needless encroachments upon it are deviations from the spirit, which ought to be diffused through all laws, and impair the benefit which they ought to confirm, can it be supposed that the rights of conscience ought not to be guarded from violation? Rights of this kind are the last which men can ever be imagined to give up to be modelled at the pleasure of others; nor (as it is argued) is there any one principle connected with their submission to governors in other respects, that can require or justify such a surrender. Does it follow that, because the magistrate is entrusted with authority to decide disputes between us and our fellow-citizens concerning property, he is to determine points which lie only between God and our own consciences? Because it is allowed to be his office to guard the peace of his subjects, and to inflict punishments for this purpose on those who unjustly disturb it; is it to be taken for granted, that he is to dictate to them what rule of faith they shall adopt, and in what manner they are to worship the Deity; when it is allowed on all hands, that of these things the will of God is the only rule, and that no worship can be acceptable to him, but what is accompanied with the sincere conviction of him who offers it? Besides, it is argued, that such is the nature of this right, and it so stands upon a foundation peculiar to itself, and is distinguished from every other right, that it cannot be given up. Property may be resigned, transferred, or submitted to the regulation of others; a man may relinquish his ease and subject himself to inconveniences, and be not only innocent but laudable; nay, he may sacrifice life itself, and merit the highest applause; but his conscience he cannot resign.

To prove all things, and hold fast that which is good, is not only a privilege but a duty; an obligation laid upon him by the very nature of religion and virtue, and from which he cannot discharge himself without departing from the principles of both. It must always remain entire to him; nor, while the principles of the most reasonable liberty are allowed to subsist in their due extent, can any attempt be consistently made to take it from him.

From these principles it has been inferred, by Locke and many others, that toleration, so far from being a matter of mere grace or favour, which government has a right to withhold, grant, abridge, or resume at pleasure, is the acknowledgment and confirmation of a right: not one of those adventitious rights, which are subsequent to the establishment of civil societies, and arise out of the peculiar forms and constitution of it; but of those higher rights which belong to men as such, and which ought to be preserved under all states and governments whatever, as effectually, universally, and impartially as any other right. With regard to the extent of toleration, it is urged, that if liberty of conscience be a right essential to human nature, all penalties in cases merely of a religious nature must be an infringement of a right, and a degree of oppression, though inflicted by a law. Farther, the inquiry concerning the persons entitled to toleration does not depend on the supposed truth or error of the sentiments which men may adopt, but upon the common right, which all men have, to be led in these points by the light of their own minds, and to enjoy all the securities and benefits of society, while they fulfil the obligations of it. All who can give good security to the government under which they live, and to the community to which they belong, for the performance of the duties of good subjects and good citizens, have an undoubted claim to it, and cannot, with any just reason be deprived of it. It is not error, but injury to the state, or the individuals who are under the care of it, which justifies the animadversion of the magistrate; and all to whom this cannot be justly imputed are the objects of his protection. See on this subject Fownes's Enquiry into the Principles of Toleration, &c. Locke's Letters concerning Toleration, &c. Hoadley's Rights of Subjects, *passim*.

To the account above given of the general principles of toleration, it will be proper to add a few words concerning the state of toleration in our own country.

The spirit of the church of England, from the reformation to the present time, has been briefly described, and we think with great justice and candour, by the late excellent bishop Porteus: "Although," said he, "after it had shaken off the galling yoke of popery, it could not of a sudden divest itself of all its ancient hereditary prejudices: although it was a considerable length of time before it could fancy itself secure against the protestant separatists without that body-guard of pains and penalties, with which it had been accustomed to see itself, as well as every church in Europe, surrounded: yet, even in the plenitude of authority, and when its ideas and exercise of ecclesiastical discipline were at the highest, it stands chargeable with fewer acts of extravagant severity than any other established church, of the same magnitude and power, in the Christian world. By degrees, however, as it improved in knowledge, it improved in mildness too. The last century saw the beginning, and the present times have seen the farther extension, of a most noble system of religious liberty, which has placed legal toleration on its true basis: a measure no less consonant to sound policy than to the spirit of Christianity." Sermons, edit. 3d. vol. i. p. 292.

The greatest extension of the principle of toleration in this country has been by the 52 Geo. III. c. 155, entitled "an act to repeal certain acts, and amend other acts, relating to religious worship and assemblies, and persons teaching or preaching therein;" (29th July, 1812). In order to understand the bearings and effect of this important and salutary act of parliament, it may be necessary to advert to the situation in which dissenting societies were placed, and to some of the proceedings of the committees for the purpose of procuring an extension of privileges.

By the conventicle act (22 Charles II. c. 1.) it was enacted, that if any person of sixteen years of age and upwards should be present at any conventicle or meeting for religion, other than according to the liturgy and practice of the church of England, at which should be present above five persons, besides those of the same household, he should pay a fine of five shillings for the first offence, and ten shillings for every subsequent offence; which penalties might, in case of the poverty of an offender, be levied on the goods and chattels of any person present. Every person who should teach or preach at such conventicle or meeting should forfeit twenty pounds for the first offence, and forty pounds for every subsequent offence. Every person who should suffer any such conventicle or meeting in his house or premises should forfeit twenty pounds, which, in case of his poverty, might be levied upon the goods of any person present. The justices and the military were impowered to enter conventicles, and disperse religious meetings. And the act declares the principle (most severe and intolerant) upon which it is to be interpreted, namely:—"That it shall be construed most largely and beneficially for the suppressing of conventicles, and for the justification and encouragement of all persons to be employed in the execution thereof;" and that no record, warrant, or mittimus to be made by virtue of that act, or any proceedings thereupon, should be reversed, avoided, or any way impeached, by reason of any default in form! It was also declared, that the goods and chattels of the husband should be liable for the penalties incurred by the wife for attending a meeting for religious worship.

As to the five mile act (17 Charles II. c. 2) it is thereby declared, that persons therein mentioned who should preach in any conventicle should not come within five miles of any corporate town sending burgesses to parliament, unless in passing upon the road, before such person shall have taken the oath therein-mentioned, at the quarter-sessions, under a penalty of forty pounds.

Besides these two acts of parliament, there were several other acts which rendered nonconformity, or a deviation from the established religion of the country, unlawful, and highly penal.

Thus stood the law relative to religious assemblies on the accession of king William and queen Mary, when, or soon afterwards, an act of parliament was passed for the relief of conscientious persons, suffering under or exposed to those intolerant and oppressive laws. By that act (1 William and Mary, c. 18) usually called the toleration act, it was in substance declared, that with regard to private individuals, the former acts should not extend to any person dissenting from the church of England, who should at the sessions take the oaths, and subscribe the declaration therein mentioned; and with regard to the ministers of religion, it was enacted that no person dissenting from the church of England, in holy orders, or pretended holy orders, or pretending to holy orders, nor any preacher or teacher of any congregation of dissenting protestants, who should at the sessions make the declaration and take the oaths therein expressed, should be liable to the penalties of the acts of parliament therein mentioned. Provided that such person should not at any time preach in any place with the doors locked, barred, or bolted. By this act also, a justice was empowered at any time to require any person that went to any meeting for the exercise of religious worship, to subscribe the declaration and take the oaths therein mentioned; and in case of refusal, to commit such persons to prison. And the ministers of religion having taken the oaths under the act, were exempt from certain offices. It was declared, that no assembly for religious worship should be allowed till registered. And disturbers of religious worship coming into a registered place were subjected to the penalty of twenty pounds. There are other provisions in the act, which it may be unnecessary to mention; nor need we particularise the statute of the 10th of queen Anne, c. 2, which extends the liberty of a person having taken the oaths in one county, to preach in another county; nor the statute of the 19th George III. which regulates the oaths and declaration to be made, and extends the exemptions.

It was only by the operation of these last acts, that any protestant not resorting to the established church could be protected from the antecedent penal statutes; and in proportion as the construction of these tolerating acts was limited, would be the destructive operation of those penal statutes. However, these acts of toleration were considered by the various classes of dissenters as the palladium of their religious liberty; and their efficacy for the protection of the various classes of dissenters was never questioned till very lately: and all who believed it their duty to preach the religious doctrines which they held, and were inclined to protect themselves from the penalties of former acts, found little difficulty in getting the magistrates at the sessions to administer the oaths, &c. as it was the generally received doctrine, that the magistrates acted merely ministerially—that they had no authority to enquire into the fitness or character of the applicant—and could not refuse the oaths, &c. to any man who represented himself in holy orders, or pretended holy orders, or as pretending to holy orders; or as being a teacher or preacher of a congregation dissenting from the church of England; and it was thought, that there could scarcely be any dissenting teacher of religion who could not properly consider himself as falling within one of the above descriptions. But latterly there has been a manifest alteration in the conduct of many magistrates, who, by narrowing the construction of the toleration act, have, on many alleged reasons, refused the oaths, &c. to several applicants. The new construction of the magistrates has, in some points of very great importance to the religious nonconformists, or occasional conformists, been sanctioned by the court of King's Bench, which held, that a man to entitle himself to take the oaths, &c. as required by the act of toleration, ought to shew himself to be the acknowledged teacher or preacher of some particular congregation, and that it was not enough for a man to state himself a protestant dissenter, who preaches to several congregations of protestant dissenters.

Something more, then, seemed absolutely necessary to do away the causes of uncertainty and anomaly in the interpretation of former acts: and to this end the act whose title we have above quoted was evidently framed. Of this act we shall now present a brief sketch.

It absolutely repeals the five mile and the conventicle acts, and another act of a most offensive kind, which affected a highly respectable body, the quakers. It then proceeds to relieve from the penalties of the several acts mentioned in the toleration act, or any amendment of the same, all protestants who resort to a congregation allowed by the acts there referred to. It is not now necessary that a person should be obliged to relinquish his attachment to the established church, in order to bring himself under the protection afforded by this act: and on the other hand, if he be a dissenter he is protected by this bill. The simple condition of protection is, that a protestant do resort to some place of worship, which if not the only way, is at least the usual and overt manner of shewing our belief in the existence of the Deity, and in a future state of retribution; without which there is no security for the peace and happiness of society. As under the toleration act, so under this act, all places of worship must be certified to the proper court; but under this act a preacher need not wait till the place be registered before he preaches. By the former acts only five persons could meet together, besides a man's own family, without having the place registered; by this act, the number is extended to twenty persons who may meet without certifying the place of meeting. By the former act, no person could preach till he had taken the oaths; by this act any person may preach without having taken the oaths; and is merely liable to be called on once to take them afterwards, if required in writing by one justice. By the toleration acts persons were obliged to go to the quarter sessions to take the oaths; by this act any person may take them before one justice only; and in no case is such person compellable to travel above five miles for that purpose: so that it will be perfectly unnecessary for any preachers or teachers to take the oaths until they are required by a justice, unless travelling preachers, who carry on no business, and intend to claim exemption from civil and military duties. By the new construction of the toleration act, it appeared that only particular persons could insist upon taking the oaths, &c. by this act any protestant, whether preacher or otherwise, whether a dissenter or a member of the church of England, may require a justice to administer the oaths, &c. and grant a certificate.

As to the exemption from civil and military duties, they are about the same, as to preachers carrying on no business, except that the toleration act extended only to dissenters, and this act exempts all preachers as they were by the toleration and new militia bills, whether dissenters or not. By the toleration act, so by this, the doors of all places of worship are to be unlocked. In this act is a great and most beneficial alteration for the protection of religious assemblies. The toleration act did not provide for the punishment of riotous persons who did not come into the house, by which means many congregations were greatly disturbed by noises made on the outside; but by this act, any person who shall wilfully and maliciously disturb a congregation (whether by coming into, or being on the outside of the house) shall incur a penalty of 40*l.* which penalty is double the amount of that imposed for the same offence by the toleration act. There is also another important advantage in this act, which is, that the writ of *certiorari* is not taken away, by which means, proceedings may be removed into the court of King's Bench.

Such is a sketch of the state in which orthodox protestant dissenters and methodists now stand in this country, with respect to toleration. We shall terminate this article by quoting a passage from the Christian Politics of the late Mr. Ely Bates. This elegant writer, and most excellent man, concludes his section "on the most effectual methods by which an established church may support herself under a complete toleration," thus:—"A national church, in her doctrine sound and evangelical, equally remote from a dry heathen morality and a wild enthusiasm, from pharisaic confidence and antinomian presumption; in her instruction of children familiar and catechetical; in her public teaching plain and expository; in her worship pure and devotional; in her discipline strict without rigour; in her ministers exhibiting her pastoral care as well as her aptitude to teach; in her pretensions reserved and modest; in her conduct towards other churches candid and liberal; and, in the last place, in her terms of admission to her communion, moderate without laxity; neither so narrow as to make it difficult for wise and good men to enter without some wound to their conscience, nor so wide as to allow an easy ingress to the profane and the profligate: a church that bears these characters, and answers to this description, can have nothing to fear from the most complete toleration: she would have few separatists from her communion, at least few of such as held the faith in a pure conscience; and as to the conventicles of heresy and schism, they would have no other effect than to draw off those noxious humours and inflammable spirits, which, if retained, would only have served to corrupt her purity, or disturb her peace."

See DISSENTER, NONCONFORMIST, PAPIST, TEST, &c.

TOLL. *s.* (*tollo*, Lat. toll, Sax. *tol*, Dut.) An excise of goods; a seizure of some part for permission of the rest (*Arbuthnot*).

To TOLL. *v. n.* (from the noun.) 1. To pay toll or tollage (*Hudibras*). 2. To take toll or tollage (*Tusser*). 3. To sound as a single bell (*Dryden*).

To TOLL. *v. a.* (*tollo*, Latin.) 1. To ring a bell (*Graunt*). 2. To take away; to vacate; to annul. In this sense the *o* is short (*Ayliffe*). 3. To take away, or perhaps to invite (*Bac.*).

TO'LLBOOTH. *s.* (*toll* and *booth.*) A prison.

To TO'LLBOOTH. *v. a.* To imprison in a tollbooth (*Corbet*).

TO'LLGATHERER. *s.* (*toll* and *gather.*) The officer that takes toll.

TO'LSEY. *s.* The same with *tollbooth*.

TOLOSA, a town of Spain, in Biscay, capital of the district of Guipuscoa; celebrated for its steel manufactures, particularly of sword-blades. It was taken by the French in 1794. It is seated in a valley, between the Araxis and Oria, 36 miles E. of Bilboa. Lon. 2. 5 W. Lat. 43. 12 N.

TOLU, a seaport of Terra Firma, in the government of Carthagena; famous for its balsam, produced from a tree like a pine. It is seated on a bay, 70 miles S. of Carthagena. Lon. 75. 16 W. Lat. 9. 30 N.

TOLU BALSAM. See BALSAMUM TOLUTANUM.

TOLU TREE. See TOLUIFERA.

TOLUIFERA, in botany, a genus of the class decandria, order monogynia. Calyx five-toothed, campanulate; petals five; the lowest very large and inversely heart-shaped; styleless. One species only, T. balsamum, balsam of tolu tree. Tree branched, and of a large size; leaves alternate, oblong-ovate; flowers produced in small axillary racemes, on a slender pedicel; fruit a round berry. The gummy exudation from the bark is the officinal balsam of tolu. It is a native of South America; and occasionally cultivated in our hot-houses. For the medical virtues of the balsam, see Balsamum tolutanum.

TOLUTA'TION. *s.* (*toluto*, Latin.) The act of pacing or ambling (*Brown*).

TOMATOES, in botany. See Solanum.

TOMB. *s.* (*tombe, tombeau*, French.) A monument in which the dead are enclosed (*Dryden*).

To Tomb. *v. a.* (from the noun.) To bury; to entomb (*May*).

TO'MBLESS. *a.* (from *tomb*.) Wanting a tomb; wanting a sepulchral monument (*Shakspeare*).

TO'MBOY. *s.* A mean fellow; sometimes a wild coarse girl (*Shakspeare*).

TOMBUCTOO, a kingdom of Negroland, which lies to the W. of Bambara, and E. of Tocrur. It produces plenty of corn, cattle, milk, and butter. The king is despotic, and has 3000 horsemen, beside a great number of foot, who frequently take captives, and sell them to the merchants for slaves. The houses are built like bells, with walls of hurdles plaistered with clay, and covered with reeds. The better sort of women have their faces covered, their religion being Mahometanism. Both men and women are fond of dancing, and spend a great part of the night in that exercise.

Tombuctoo, the capital of the kingdom of the same name, with a stately mosque built of stone, and a royal palace. Here are many cotton-weavers, and ingenious mechanics. Cloth and other European merchandise are brought by caravans from Barbary; these are exchanged for ivory, slaves, sena, gold-dust, dates, ostriches feathers, &c. brought from the interior and more maritime parts of Africa. This city is subject to a well regulated police, and the inhabitants are in general very rich. It is seated on the Niger, 290 miles E.N.E. of Sego. Lon. 1. 38 W. Lat. 16. 35 N.

TOME. *s.* (French; τομος.) 1. One volume of many. 2. A book (*Hooker*).

TOMENTUS, in botany. (*Tomentum*, down, nap, cotton, or flocks, from τεμνω: or, as others think, from *tumeo*, to swell up; being used to stuff pillows, bolsters, &c. It is properly the short wool that is not carded and spun; and was applied to the nap on the leaves of some plants, which was used for the same purpose. Hence *gnaphalium*, from γναφαλον, which has the same signification.) Downy, nappy, cottony, or flocky. It is applied to the stem and leaf, when they are covered with hairs so interwoven as scarcely to be discernible: and is a species of pubescence. It is generally white, as on sea plants, and such as grow in exposed situations. Exemplified also in cerastium tomentosum, origanum onites, althæa officinalis, cistus incanus.

TOMENTUM CEREBRI. (A flock of wool.) The small vessels that penetrate the cortical substance of the brain from the pia mater, which, when separated from the brain, and adhering to the pia mater, give it a flocky appearance, whence the present nam

TOMEX, in botany, a genus of the class dodecandria, order monogynia. Involucre four or five-leaved; calyxless; corol five-petalled; nectaries five, scales between the lower stamens; berry one-seeded. Three species, natives of Japan and China, from one of which, T. sebifera, the Chinese obtain tallow, by expressing its kernels; whence this, as well as croton sebiferum, is denominated tallow-tree.

TOMPION, a sort of bung or cork used to stop the mouth of a cannon. At sea this is carefully encircled with tallow or putty, to prevent the penetration of water into the gun, by which the powder contained in the chamber might be damaged or rendered incapable of service.

TOMSK, a town of Siberia, in the province of Tomsk. On the highest part stands a wooden castle, defended by 14 pieces of cannon; and in it are a cathedral built of wood, the chancery, and an arsenal. The inhabitants carry on a great trade, this town lying on the great road through all the east and north parts of Siberia. It contains above 2000 houses, and is seated on the river Tom, 105 miles E.S.E. of Tobolsk. Lon. 84. 59 E. Lat. 55. 45 N.

TOMTIT, in ornithology. See Parus.

TON, a measure or weight. See Tun.

Ton or Tun, in the names of places, are derived from the Saxon ꞇun, *a hedge* or *wall*; and this seems to be from ꝺun, *a hill*, the towns being anciently built on hills (*Gibson*).

TONDEREN, or Tunderen, a town of Denmark, in the duchy of Sleswick, capital of a bailiwic of the same name, with a fort. It is seated in a fertile country, on the river Widaw, and on a bay of the German ocean, 25 miles S.E. of Ripen, and 30 N.W. of Sleswick. Lon. 9. 40 E. Lat. 54. 58 N.

TONE. *s.* (*ton*, French; *tonus*, Latin.) 1. Note; sound (*Bacon*). 2. Accent; sound of the voice (*Dryden*). 3. A whine; a mournful cry (*Hudibras*). 4. A particular or affected sound in speaking. 5. Elasticity; power of extension and contraction (*Arbuthnot*).

Tone, in music, has various senses.

First, Tone is used to signify a certain degree of distance or interval between two sounds, as in the major-tone and the minor-tone, the reference of the first of which is from 8 to 9, and which results from the difference of the 4th to the 5th, while the reference of the latter is from 9 to 10, and results from the difference of the minor-third to the fourth.

Secondly, The word tone implies a property of sound, by which it comes under the relation of grave and acute; or the degrees of elevation in any sound, as produced by the particular velocity of the vibrations of the sonorous body.

Thirdly, We understand by tone, the particular quality of the sound of any voice or instrument, independent of the acuteness or gravity of the note it produces; as when we speak of a thin tone, a full tone, a rich tone, a mellow tone, a liquid tone, a round tone, &c.

TONG. *s.* (see Tongs.) The catch of a buckle.

TONGATABOO, or Amsterdam Island, one of the Friendly Islands, 20 leagues in circuit. It has the best harbour or anchoring-place to be found among these islands. It is wholly laid out in plantations, with roads or lanes for travelling; and is the seat of government for all the other islands, and the ordinary residence of all the principal chiefs. Lon. 175. 5 W. Lat. 21. 8 S.

TONGRES, a town in the bishopric of Liege, formerly one of the richest and most flourishing cities in the Roman province of Gallia Belgica. It has severely suffered by the calamities of war; the first time by Attila, king of the Huns, and the last by the French in 1673 and 1677. It is seated on the Jecker, 12 miles S.W. of Maestricht, and 15 W. of Liege.

TONGS. *s.* (ꞇanᵹ, Saxon; *tang*, Dutch.) An instrument by which hold is taken of any thing; as of coals in the fire (*Mortimer*).

TONGUE. *s.* (ꞇunᵹ, Saxon, *tonghe*, Dut.) 1. The instrument of speech in human beings (*Dryden*). 2. The organ by which animals lick (*Milton*). 3. Speech; fluency of words (*L'Estrange*). 4. Power of articulate utterance (*Dryden*). 5. Speech, as well or ill used (*Milton*). 6. A language (*Watts*). 7. Speech, as opposed to thoughts (*John*). 8. A nation distinguished by their language. A scriptural term (*Isaiah*). 9. A small point: as, *the* tongue *of a balance*. 10. *To hold the* Tongue. To be silent (*Addison*).

To Tongue. *v. a.* (from the noun.) To chide; to scold (*Shakspeare*).

To Tongue. *v. n.* To talk; to prate (*Shakspeare*)

Tongue. (*lingua.*) A soft fleshy viscus, very moveable in every direction, situated inferiorly in the cavity of the mouth, and constituting the organ of taste. It is divided into a base, body, and back, an inferior surface, and two lateral parts. It is composed of muscular fibres, covered by a nervous membrane, on which are a great number of nervous papillæ, particularly at the apex and lateral parts; the rete mucosum, and epidermis. The arteries of the tongue are branches of the ranine and labial. The veins empty themselves into the great lingual, which proceed to the external jugular. The nerves come from the eighth, ninth, and fifth pair. The use of this organ is for chewing, swallowing, sucking, speaking, and tasting. See Taste.

TO'NGUED. *a.* (from *tongue.*) Having a tongue (*Donne*).

TO'NGUELESS. *a.* (from *tongue*). 1. Wanting a tongue; speechless (*Shakspeare*). 2. Unnamed; not spoken of (*Shakspeare*).

TO'NGUEPAD. *s.* (*tongue* and *pad.*) A great talker (*Tatler*).

TONGUE-SHAPED LEAF, in botany. Folium linguiforme. Linear and fleshy, blunt at the end, convex underneath, and having usually a cartilaginous border: as in some aloes, mesembryanthemum lingueforme, hæmanthus coccineus.

TONGUETI'ED. *a.* (*tongue* and *tie.*) 1. Having an impediment of speech (*Holder*). 2. Unable to speak freely, from whatever cause *Shakspeare*).

TONIC. The name given to the key-note of any composition. Also applied by Aristoxenus to that of the three kinds of the chromatic genus, which proceeded by two consecutive semitones, and a minor-third, and was the ordinary chromatic of the Greeks. Tonic is also sometimes used adjectively; as when we speak of the tonic chord, the tonic note, &c.

Tonics. (from *τεινω*, to expand or invigorate.) Medicines which increase the tone of the muscular fibre; such as stimulants, adstringents, &c.

Tonic spasm. (*Τονικος*, from *τεινω*, to pull or draw.) Contractura a spasmo. In medicine, a rigid contraction of the muscles, without relaxation, as in trismus, tetanus, &c.

TONNAGE, a custom or impost due for merchandise brought or carried in tons from or to other nations after a certain rate in every ton.

Tonnage. The usual method of finding the tonnage of any ship is by the following rule:—Multiply the length of the keel by the breadth of the beam, and that product by half the breadth of the beam: and divide the last product by 94, and the quotient will be the tonnage.

Ship's keel 72 feet; breadth of beam 24 feet.

$$\frac{72 \times 24 \times 12}{94} = 120.6 \text{ tonnage.}$$

The tonnage of goods and store is taken sometimes by weight, and sometimes by measurement; and that method is allowed to the vessel which yields the most tonnage. In tonnage by weight, 20 cwt. make one ton. In tonnage by measurement, 40 cubic feet are equal to 1 ton. All carriages, or other stores to be measured by tonnage, are taken to pieces, and packed in the manner which will occupy the least room on board ship. All ordnance, whether brass or iron, is taken in tonnage by its actual weight. Musket-cartridges in barrels or boxes, all ammunition in boxes, and other articles of great weight, are taken in tonnage according to their actual weight.

The following is the tonnage allowed to the military officers of the ordnance embarked for foreign service, for their camp-equipage and baggage:

For a field officer -	5 tons.
For a captain -	3 do.
For a subaltern -	1½ do.

TONNAY BOUTONNE, a town of France, in the department of Lower Charente, seated on the river Boutonne, 17 miles N. of Saintes. Lon. 0. 34 W. Lat. 45. 56 N

Tonnay Charente, a town of France, in the department of Lower Charente, with a castle and a small port. It is seated on the Charente, three miles from Rochefort, and 253 S.W. of Paris. Lon. 0. 46 W. Lat. 45. 56 N.

TONNERRE, a town of France, in the

department of Yonne, famous for its good wines. It is seated on the Armancon, 27 miles S. of Troyes, and 102 E. of Paris. Lon. 4. 4 E. Lat. 47. 51 N.

TONORIUM. (Lat.) A kind of pitch-pipe, something like the fistula, or syringe, used by the ancient Romans to regulate the voices of orators, actors, and singers.

TONNINGEN, a town of Denmark, in the duchy of Sleswick, capital of a territory of the same name. It is seated on a peninsula formed by the river Eyder, where there is a commodious harbour, 25 miles S.W. of Sleswick, and 58 N.W. of Hamburg. Lon. 9. 10 E. Lat. 54. 30 N.

TONQUIN, a kingdom of Asia, bounded on the N. by China, on the E. by China and the gulf of Tonquin, on the S. by Cochin China, and on the W. by Laos. It is about 1200 miles in length, and 500 in breadth, and is one of the finest and most considerable kingdoms of the East, as well on account of the number of inhabitants, as the riches it contains, and the trade it carries on. The natives in general are of a middling stature, and clean-limbed, with a tawny complexion. Their faces are oval and flattish, and their noses and lips well proportioned. Their hair is black, long, lank, and coarse; and they let it hang down their shoulders. They die their teeth black. They are dexterous, active, and ingenious in mechanic arts. They weave a great quantity of fine silks, and make curious lacker-works, which are exported to other countries. There is such a number of people, that many want employment, for they seldom go to work but when foreign ships arrive. The money and goods brought hither by the English and Dutch put them in action, for they have not money of their own sufficient to employ themselves; and therefore one-third at least must be advanced beforehand by the merchants. They are so addicted to gaming, that when every thing else is lost, they will stake their wives and children. The garments of the Tonquinese are made either of silk or cotton; but the poor people and soldiers wear only cotton of a dark tawny colour. Their houses are small and low, and the walls either of mud, or hurdles daubed over with clay. They have only a ground floor, with two or three partitions, and each room has a square hole to let in the light. They have stools, benches, and chairs; and on the side of a table is a little altar, with two incense pots thereon, which no house is without. The country abounds with villages, which consist of thirty or forty houses, surrounded by trees; and in some places are banks to keep the water from overflowing their gardens, where they have oranges, betels, pumkins, melons, and salad herbs. In the rainy season they cannot pass from one house to another without wading through the water, but sometimes they have boats. The Tonquinese in general are courteous to strangers; but the great men are haughty and ambitious, the soldiers insolent, and the poor thievish. They buy all their wives, of which the great men have several; but the poor are stinted for want of money. In hard times the men will sell both their wives and children, to buy rice to maintain themselves. When a man dies, he is buried in his own ground, and if he was master of a family, they make a great feast. The first new moon that happens after the middle of January is a great festival; when they rejoice for ten days together, and spend their time in all manner of sports. They have another great feast in May or June, when their first harvest is got in. Their religion is paganism, and yet they own a Supreme Being. Their idols have human shapes, but in very different forms. They have likewise some resembling elephants and horses, placed in small low temples built of timber. The language is very guttural, and some of the words are pronounced through the teeth: it has a great resemblance to the Chinese. They have schools of learning, and their characters are the same, or like those of China; and like them they write with a hair pencil. The commodities are gold, musk, silk, calicoes, drugs of many sorts, woods for dying, lackered wares, earthen wares, salt, aniseed, and worm-seed. The lackered ware is not inferior to that of Japan, which is accounted the best in the world. With all their merchandise, the people are in general very poor; the chief trade being carried on by the Chinese, English, and Dutch. This kingdom is an absolute monarchy. Cachao is the capital.

TONSELLA, in botany, a genus of the class triandria, order monogynia. Calyx five-parted; petals five; nectary pitcher-shaped; berry one-celled, four-seeded. Two species, trees of Guiana.

TONSILS, in anatomy. Tonsillæ. Amygdalæ. Two oblong, suboval glands, situated one on each side of the fauces, and opening into the cavity of the mouth by twelve or more large excretory ducts.

TONSTALL (Cuthbert), a learned English divine and mathematician, was born in the year 1476. He entered a student at the university of Oxford about the year 1491; but afterwards, being driven from thence by the plague, he went to Cambridge, and shortly after to the university of Padua in Italy, which was then in a flourishing state of literature, where his genius and learning acquired him great respect from every one, particularly for his knowledge in mathematics, philosophy, and jurisprudence.

Upon his return home, he met with great favours from the government, obtaining several church preferments, and the office of secretary to the cabinet of the king, Henry VIII. This prince, having also employed him on several foreign embassies, was so well satisfied with his conduct, that he first gave him the bishopric of London in 1522, and afterwards that of Durham in 1530.

Tonstall approved at first of the dissolution of the marriage of his benefactor with Catherine of Spain, and even wrote a book in favour of that dissolution; but he afterwards condemned that work, and experienced a great reverse of fortune. He was ejected from the see of Durham for his religion in the time of Edward VI. to which however he was restored again by queen Mary, in the beginning of her reign, but was again expelled, in 1559, when queen Elizabeth was settled in her throne, and he died in a prison a few months after, in the 84th year of his age.

Tonstall was doubtless one of the most learned men of his time. "He was," says Wood, "a very good Grecian and Ebritian, an eloquent rhetorician, a skilful mathematician, a noted civilian and canonist, and a profound divine. But that which maketh for his greatest commendation is, that Erasmus was his friend, and he a fast friend to Erasmus, in an epistle to whom, from sir Thomas More, I find this character of Tonstall, that—'As there was no man more adorned with knowledge and good literature, no man more severe, and of greater integrity for his life and manners; so there was no man a more sweet and pleasant companion, with whom a man would rather choose to converse.'"

His writings that were published were chiefly the following:

1. In Laudem Matrimonii, Lond. 1518, 4to.—But that for which he has been principally noted, was his book upon arithmetic, viz. 2. De Arte Supputandi, Lond. 1522, 4to. dedicated to sir Thomas More. This was afterwards several times printed abroad. 3. A Sermon on Palm Sunday before king Henry VIII. &c. London 1539 and 1633, 4to. 4. De Veritate Corporis et Sanguinis Domini in Eucharistia. Lutet. 1554, 4to. 5. Compendium in decem Libros Ethicorum Aristotelis. Par. 1554, in 8vo. 6. Contra impios Blasphematores Dei prædestinationis opera, Antw. 1555, 4to. 7. Godly and devout Prayers in English and Latin, 1558, in 8vo.

TONTINE, a variable kind of life annuity, but generally so contrived as to be progressively increasing in amount. It is formed by nominating a certain number of lives within limited ages, who for each one hundred pounds, or any other gross sum paid down, are to receive at first a specific annuity, but as any of the lives fail, their annuity is to be equally divided among those that remain, by which means those who happen to survive a considerable number of years obtain a large augmentation of their annual receipt, and the life, which is the longest liver of the whole (if there is no restriction to the contrary) gets for the remainder of its continuance, the total sum paid at first to all the nominees. Tontines of this kind, if properly conducted, are considered by some persons as affording an eligible opportunity of making some provision for children, as the nomination of young healthy lives gives a good chance of survivorship. It has several times been attempted to raise money on this species of annuity for the service of government, but it has never been found practicable to obtain any considerable sum in this way; on a smaller scale it has been adopted successfully both in Great Britain and Ireland, for procuring the sums necessary for building bridges, large inns or hotels, and other expensive edifices.

Of late years many delusive schemes have been set on foot under the name of tontines, but differing very materially from the plan above mentioned, as they do not require a gross sum to be paid down, but quarterly or half yearly payments during their continuance, which is limited to the short period of five, seven, or ten years; the intention being, that the subscribers should receive back all they had contributed, with the additions made to it from improvement at compound interest; and the division of the contributions of such as might happen to die within the term. But the difference between compound and simple interest in the improvement of such payments, for a short time, is so trifling, and the probability of any considerable reduction, during such term, in the number of a set of young lives, who it may be presumed were thought healthy subjects at the time of their nomination, is so small, that the advantages derived from these sources have been sometimes overbalanced by the expences of management, and, in fact, in several instances of these schemes, which have expired within these few years past, the subscribers have actually received considerably less than the payments they had made would have amounted to without any improvement at interest.

TOO. *ad.* (ꞇo, Saxon.) 1. Over and above; overmuch; more than enough (*Sprat*). 2. Likewise; also (*Oldham*).

TOOBOUAI, an island in the Pacific Ocean, discovered by captain Cook. It is not, in any direction, above six miles over; but there are hills in it of a considerable elevation, covered with herbage, except a few rocky cliffs, with patches of trees interspersed to their summits. It is plentifully stocked with hogs and fowls, and produces several kinds of fruits and roots. Lon. 149. 23 W. Lat. 23. 25 S.

TOOK. The preterit and sometimes participle passive of *take*.

TOOL. *s.* (ꞇol, ꞇool, Saxon.) 1. Any instrument of manual operation (*Heylin*). 2. A hireling; a wretch who acts at the command of another (*Swift*).

To TOOT. *v. n.* To pry; to peep; to search narrowly and slily (*Spenser*).

TOOTH. See ANATOMY and DENTITION.

TOOTH is used, 2. for palate (*Dryden*). 3. A tine, prong, or blade, of any multifidous instrument (*Newton*). 4. The prominent part of wheels, by which they catch upon correspondent parts of other bodies (*Moxon*). 5. TOOTH *and nail*. With one's utmost violence (*L'Estrange*). 6. *To the* TEETH. In open opposition (*Shakspeare*). 7. *To cast in the* TEETH. To insult by open exprobration (*Hooker*). 8. *In spite of the* TEETH. Notwithstanding any power of injury or defence (*L'Estrange*). 9. *To show the* Teeth. To threaten (*Young*).

To Tooth, *v. a.* (from the noun.) 1. To furnish with teeth; to indent (*Grew*). 2. To lock in each other (*Moxon*).

Tooth-ach. See Odontalgia.

Tooth-ach tree. See Xanthoxylum.

TO'OTHDRAWER. *s.* (*tooth* and *draw.*) One whose business is to extract painful teeth (*Wiseman*).

TO'OTHED. *a.* (from *tooth.*) Having teeth.

Toothed, in botany. See Dentate.

TO'OTHLESS. *a.* (from *tooth.*) Wanting teeth; deprived of teeth (*Ray*).

TO'OTHPICK. To'othpicker. *s.* (*tooth* and *pick.*) An instrument by which the teeth are cleansed from any thing sticking between them (*Sandys*).

TOOTH-SHELL, in helminthology. See Dentalium.

TO'OTHSOME. *a.* (from *tooth.*) Palatable; pleasing to the taste (*Carew*).

TO'OTHSOMENESS. *s.* (from *toothsome.*) Pleasantness to the taste.

TO'OTHWORT. See Dentaria.

TOP. *s.* (*topp*, Welsh; ꞇop, Saxon; *top*, Dutch.) 1. The highest part of any thing (*Cowley*). 2. The surface; the superficies (*Bacon*). 3. The highest place (*Swift*). 4. The highest person (*Shakspeare*). 5. The utmost degree (*Sprat*). 6. The highest rank (*Locke*). 7. The crown of the head (*Shaks.*). 8. The hair on the crown of the head; the forelock (*Shakspeare*). 9. The head of a plant (*Watts*). 10. An inverted conoid which children set to turn on the point, continuing its motion with a whip (*Shakspeare*). 11. *Top* is sometimes used as an adjective to express lying on the top, or being at the top (*Mortimer*).

Top, in naval affairs, a sort of platform surrounding the lower mast head, from which it projects on all sides like a scaffold. The intention of the top is to extend the top-mast shrouds so as to form a greater angle with the mast, and thereby give additional support to the latter. The top is likewise convenient to contain the materials necessary for extending the small sails, and for fixing and repairing the rigging and machinery with greater expedition. In ships of war, the tops are furnished with swivels, musketry, and other fire-arms, and are guarded with a fence of hammocks in time of action. In this case the top is used as a kind of redoubt; and is accordingly fortified for attack or defence, being furnished with arms, and guarded by a thick fence of corded hammocks. The top is employed likewise as a place for looking out, either in the day or night.

To Top. *v. n.* (from the noun.) 1. To rise aloft; to be eminent (*Derham*). 2. To predominate (*Locke*). 3. To excel (*Dryden*).

To Top. *v. a.* 1. To cover on the top; to tip (*Waller*). 2. To rise above (*L'Estrange*). 3. To outgo; to surpass (*Collier*). 4. To crop (*Evelyn*). 5. To rise to the top of (*Denham*). 6. To perform eminently: as, *he* tops *his part.*

Top-shaped, in botany. See Turbinate.

Top-mast, and Top-sails. See Mast and Sails.

TO'PARCH. *s.* (τοπος and αρχη.) The principal man in a place (*Brown*).

TO'PARCHY. *s.* (from *toparch.*) Command in a small district.

TOPAZ. A species of gem which has been restricted, by Mr. Hauy, to the stones called by mineralogists occidental ruby, topaz, and sapphire; which, agreeing in their crystallization and most of their properties, were arranged under one species by Mr. Romé de Lisle. The word topaz, derived from an island in the Red Sea, where the ancients used to find topazes, was applied by them to a mineral very different from ours. One variety of our topaz they denominated chrysolite.

The topaz is found in Saxony, Bohemia, Siberia, and Brazil, mixed with other minerals in granite rocks.

It is commonly crystallized. The primitive form of its crystals is a prism whose sides are rectangles, and bases rhombs, having their greatest angles 124° 22′, and the internal molecule has the same form; and the height of the prism is to a side of the rhomboidal bases as 3 to 2. The different varieties of topaz crystals hitherto observed amount to 6. Five of these are eight-sided prisms, terminated by four-sided pyramids, or wedge-shaped summits, or by irregular figures of 7, 13, or 15 sides: the last variety is a twelve-sided prism, terminated by six-sided pyramids wanting the apex. For an accurate description and figure of these varieties, the reader is referred to Mr. Hauy.

The texture of the topaz is foliated. It causes a double refraction. Specific gravity from 3·46 to 3·56. The Siberian and Brazil topazes, when heated, become positively electrified on one side, and negatively on the other. It is infusible by the blowpipe. The yellow topaz of Brazil becomes red when exposed to a strong heat in a crucible; that of Saxony becomes white by the same process. This shews us that the colouring matter of these two stones is different.

The colour of the topaz is various, which has induced mineralogists to divide it into the following varieties:

1. Red topaz, of a red colour, inclining to yellow; called Brazilian or occidental ruby.

2. Yellow topaz, of a golden-yellow colour, and sometimes also nearly white; called occidental or Brazil topaz. The powder of this and the following variety causes syrup of violets to assume a green colour.

3. Saxon topaz. It is of a pale wine yellow colour, and sometimes greyish white.

4. Aigue marini, of a blueish or pale-green colour.

5. Occidental sapphire, of a blue colour, and sometimes white.

A specimen of white Saxon topaz, analyzed by Vauquelin, contained

68 alumina
31 silica

99.

TOPE, in ichthyology. See Squalus.

To Tope. *v. n.* (*toppen*, Dutch, to be mad; *toper*, French.) To drink hard; to drink to excess (*Dryden*).

TO'PER. *s.* (from *tope.*) A drunkard.

TO'PFUL. *a.* (*top* and *full.*) Full to the top; full to the brim (*Swift*).

TOPGA'LLANT. *s.* (*top* and *gallant.*) 1. The highest sail. 2. It is proverbially applied to any thing elevated or splendid (*Bacon*).

TOPHA'CEOUS. *a.* (from *tophus*, Latin.) Gritty; stony (*Arbuthnot*).

TOPHEA'VY. *a.* (*top* and *heavy.*) Having the upper part too weighty for the lower (*Wotton*).

TO'PHET. *s.* (תפת, Hebrew, *a drum.*) Hell: a scriptural name. See Hinnom and Moloch.

TOPHUS. (*tophus*, Heb.) In surgery, a small tumour on a bone.

Tophus. Tufa. In mineralogy, a genus of the class earths, order calcareous. Consisting principally of carbonat of line; precipitated by water under water; porous, without lustre. Eight species.

1. T. communis. Common tufa. Calcareous stalactite. Deposited at the bottom of cold waters running through mountains and calcareous strata. Found in every part of the globe, sometimes hardening in the air, sometimes mouldering, of numerous varieties with respect to colour, and often forming the first material of calcareous strata.

2. T. osteocolla. Calcareous, sandy stalactite. Calcareous, more or less cylindrical, perforated. Found in various parts of Germany and elsewhere, both in brooks and under beds of sand, from the size of a crow quill to the thickness of a man's arm; white or ash-colour; sometimes in the shape of a bone; and was formerly supposed to have the quality of uniting broken bones. It is mostly in long, cylindric pieces, sometimes irregularly tubular, and porous; sometimes filled with a marly earth mixed with sand; with often the remains of decayed roots of trees in the centre. The incrustations do not appear in regular concentric layers, but consist of thin strata spirally rolled up; when first found in the earth it is soft and ductile, but in a very short time it hardens by exposure to the air; it consists of sand and earth cemented by a calcareous deposition.

3. T. incrustans. Incrusting animal and vegetable substances with a calcareous coating, and assuming their figure. Found in various parts of Sweden, Germany, Italy, &c. clothing with a calcareous coat the smaller branches of trees, leaves, prickles, moss, crabs, eggs, birds and their nests, preventing them from decay by defending them from the action of the atmospheric air. Most of the substances vulgarly called petrifactions are of this species.

4. T. lebetum. Fusible tufa. Incrusting the bottom and sides of vessels in which water has been boiled. Found on the bottom and round the sides of tea-kettles and other vessels in which water has been boiled, forming a thin, hard incrustation. It is formed in much greater quantities from spring than from rain-water, and is seldom without a portion of silex.

5. T. dentium. Tartar of the teeth. Forming incrustations on decayed or decaying teeth, and found in scales, plates, or irregularly shaped lumps, and seems to be produced by deposition, in the same manner as the crust in tea-kettles. Its surface is very rough, and more or less porous.

6. T. thermalis. Thermal tufa. Covering the bottoms and sides of the receptacles and canals of warm baths. Found in the warm baths of Hungary, Wisbadin, and other places, often in such quantities as to fill up the canals and ducts; more frequently white than tinged with any colour; more or less compact, and sometimes so hard as to receive a fine polish.

7. T. cremor. Consisting of very thin diaphonous scales. Found principally in warm springs containing calcareous earth, on the surface of which it floats like a pellicle.

8. T. testaceous. Consisting of the aggregate fragments of shells. Two varieties.

- α. Compact and harder. The testaceous tufa of Kirwan. Found in the neighbourhood of Syracuse, Palermo, and the promontory of Passoro in Sicily; white or yellowish-white, exceeding porous and brittle, formed of various shells broken and compacted together.
- β. Softer and not compact. The marly tufa of Kirwan. Found in most parts of Europe, yellowish-white, resembling mortar, without lustre or transparency, and very porous: fracture earthy.

TO'PIC. *s.* (*topique*, French; τοπος.) 1. Principle of persuasion (*Swift*). 2. A general head; something to which other things are referred (*Watts*). 3. A thing which is externally applied to any particular part (*Wiseman*).

TO'PICAL. *a.* (from τοπος.) 1. Relating to some general head. 2. Local; confined to some particular place (*Hale*). 3. Applied medicinally to a particular part (*Arbuthnot*).

TO'PICALLY. *ad.* (from *topical.*) With application to some particular part (*Brown*).

TO'PKNOT. *s.* (*top* and *knot.*) A knot worn by women on the top of the head (*L'Estrange*).

TO'PLESS. *a.* (from *top.*) Having no top (*Chapman*).

TOPLIS, in botany, a genus of the class syngenesia, order polygamia æqualis. Receptacle cellular; calyx invested with subulate scales longer than the calyx; down of the margin a toothed membrane, of the centre, two or four awns. One species only, a native of the south of France, with lanceolate, glabrous leaves; flowers yellow, with a purple base: involucre long, setaceous.

TO'PMAN. *s.* (*top* and *man.*) The sawer at the top (*Moxon*).

TO'PMOST. *a.* Uppermost; highest (*Addison*).

TOPO'GRAPHER. *s.* (τοπος and γραφω.) One who writes descriptions of particular places.

TOPO'GRAPHY. *s.* (τοπος and γραφω.) Description of particular places (*Cromwell*).

Topography. This term is applied to all those writings which have for their subject the description of tracts of country, and the buildings on their surfaces. We often meet with passages in the works of ancient authors which are topographical, or in other words, descriptive of particular places: but rarely or never with volumes dedicated wholly to this purpose. The scriptures have many of the former, particularly the account of Solomon's temple: Homer abounds with such in his Iliad and Odyssey, and Virgil in his Æneid; to which might be added subsequent writers, though not of equal celebrity. The two Plinys have favoured us with sketches of this nature, one of which, by the younger, we shall introduce as a specimen. Speaking of his Tuscan villa, he says, "The face of the country is extremely beautiful. Imagine to yourself an amphitheatre of immense circumference, such as could be formed only by the hand of nature: a wide-extended plain is surrounded by mountains, whose summits are covered with tall, ancient woods, stocked with game for all kind of hunting; the descent is planted with underwoods, among which are frequently little risings, of a rich and deep soil, where a stone, if sought for, is scarce to be found: in fertility they yield not to the finest vales, and produce as good crops of corn, although not so early in the year. Below these, on the side of the mountain, is a continued range of vineyards, that extend themselves without interruption far and near, at the foot of which is a sort of border of shrubs. From thence you have meadows and open fields: the arable grounds require large oxen and the strongest ploughs; the earth is so tough, and rises in such large clods when it is first broken up, that it cannot be reduced till it has been ploughed nine times: the meadows glitter with flowers, and produce the trefoil and other kinds of grass, always soft and tender, and appearing always new; for they are excellently well watered with never-failing springs; yet where these springs are in greatest confluence, they make no marshes, the declivity of the land discharging into the Tiber all the water that it does not drink in."

Had it been the custom at those very distant periods of time to write thus, frequently, and had the art of printing been then invented, how much valuable information would have reached us that is now irretrievably lost; and with what pleasure should we have read descriptions of many important places, the scites of which are now only known by conjecture from some casual circumstance! Numbers of beautiful cities, far surpassing any existing at present in the magnificence of their public structures, have been deserted, through different causes, by their inhabitants, and are yet splendid in their ruins: those offered every incitement for description, but have perished without obtaining this act of justice. Egypt, in particular, furnished the writer with the means of immortalizing his name as a topographer; and it is a subject of severe regret, that we have not been gratified by an account of that country, when all the wonderful fragments scattered over its surface were connected by the chain of society, and perfect in themselves; then, we have every reason to suppose, rich woods fringed the borders of their cities, and extensive gardens afforded equal pleasure and advantage to the inhabitants: like a sublime picture, we should have been enabled to contrast its ancient softest tints with its present dreary wastes and gloomy ruins.

The French have ever been an enterprising people, and very early turned their attention to travelling and topographical description; an interesting account of which may be found in Mr. Johnes's recent translation of Bertrand de la Broquiere's Travels in Palestine, about the year 1432. The English nation did not entirely neglect this species of literature, in the earliest periods of their annals; as several monks might be mentioned, who gave their brethren, in different parts of the country, manuscript accounts of the foundations of their monasteries, and some slight description of them and their scites. We shall introduce the title of one of those, quoted by Mr. Malcolm, in his History of St. Bartholomew's Priory, London, in order to convey to the reader an idea of their abilities in our language, about the time of Henry III. or perhaps rather earlier. "For as mooche that the meritory and notable operacyons of famose goode and devoute faders yn God sholde be remembred, for instruction of aftercūmers to theyr consolacion and encres of devotion; thys abbrevyat tretesse shal compendiously expresse and declare the wondreful, and, of celestial concel, gracious foundacion of our hoely placeys, called the priory of Seynt Bartholomew yn Smythfyld, and of the hospital of olde tyme longyng to the same; with other notabilities expediently to be knowyn; and most specially the gloriouse and excellent myracles wroghte withyn them by the intercessions, suffrages, and merytys of the forsayd benynge, feythful, and blessid of God, apostyl Sanet Bartholomy, ynto the laude of Almighty God, and agm̄cion of his infinite power. Ffyrst shal be shewyd who was ffunder of owere hoely places, and howgh, by grace, he was ffyrst pryor of owr priory; and by howgh longe tyme that he contynned yn the same. Thys churche, yn the honoure of most blessed Bartholomew apostle, ffunded Rayer, of good remembraunce. And theryn to serve God (after the rewle of the most holy fader Austyn) aggregat togidir religiouse men. And to them was prelate xxii yere; usynge the office and dignite of a priore." This ancient topographer mentions that Rahere, the prior and founder of the priory, died in the reign of king Stephen, and was succeeded by Thomas, in the year 1144. The following passage will prove that the manuscript was written immediately after the above period: "And yn what ordur he sette the fundament of this temple yn fewe wordes lette us shewe, as they testified to us *that sey him, herd him*, and were presente yn his workys and dedis; *of the whiche* sume have take ther slepe yn Cryiste, and *sume of them be ziete alyve*, and wytnesseth of that that we shall after say."

It may be perceived from this specimen of early topography, that we had by no means arrived to the degree of excellence which Pliny and his contemporaries attained in similar productions; neither did we accomplish this very desirable point till within the last century. Those who have perused our best works, historical and descriptive, before the reign of George II. will find great accuracy and deep research; but unfortunately we learn nothing of the nature and beauties of the surface of the earth, or of the proportions and sculptures of our buildings, from the valuable works of Leland, Stowe, Speed, Camden, Dugdale, &c.; indeed, had not Hollar been employed by the latter, his splendid accounts of monasteries, and St. Paul's, would have given us no idea whatever of the richness of their forms and decorations.

It is, however, to the authors, whose names we have recapitulated, that we are indebted for admirable models in topography; and it would be injustice to the moderns to deny them the merit of having greatly improved upon them, by their descending to the minutiæ which seems to have escaped the attention of their great predecessors. The public has for a very considerable length of time been extremely partial to topographical works, which is evinced by the shoals of publications issued from the London and provincial presses on this subject. The metropolis has had every thing said of it which the art of man could rake together; almost every county has its historian, and some have had several; the cities have each been described, and every town, worth or not worth a description, has its guide; and, exclusive of those, numbers of tours are continually making their appearance. It appears almost invidious to mention any particular exertions, without enumerating every well-founded pretension to public approbation; and yet we cannot conclude this article accurately without observing, that Gough's edition of Camden's Britannia, and his Sepulchral Monuments of this kingdom, are worthy of ranking with the works of our best ancient topographers; and that amongst the many excellent county histories we possess, none has a greater claim for extent and accuracy than the History of Leicestershire, by Mr. John Nichols. The environs of London have received every possible attention from the indefatigable brothers, Daniel and Samuel Lysons, who are now pursuing a most laborious undertaking on nearly the same plan, to be extended to all England; and of London, the great centre, every thing has been said by Stowe, Strype, and Malcolm; besides the slighter performance of Pennant, to whom we are more indebted for his other topographical works; and, to conclude, we now possess a Topographical Dictionary, the patient and useful production of Mr. Carlisle.

The encouragement all these and similar publications have hitherto uniformly met with has been eminently advantageous to draftsmen and engravers, whose works, for the embellishment of topographical writings, are not surpassed by any which have made their appearance on the continent; an assertion that may be proved decidedly by referring to the recent publications—The Beauties of England and Wales, and the Architectural Antiquities of Great Britain; two of the best, without exception, that have ever issued from the British press; the joint performance, in the first instance, of Messrs. Britton and Brayley, and in the second, of the former only. (*British Ency.*)

An ingenious specimen of a comprehensive series of questions tending to procure the most essential topographical and statistical information relative to a district, with its natural, commercial, and military advantages and disadvantages, &c. may be seen in liv. v. ch. 3. Traité de Topographie, D'Arpentage, et de Nivellement, par L. Puissant.

TO′PPING. *a.* (from *top.*) Fine; noble; gallant. A low word (*Tatler*).

TO′PPINGLY. *ad.* Splendidly; nobly.

To′PPINGLY. *a.* (from *topping.*) Fine; gay; gallant; showy: obsolete (*Tusser*).

To TO′PPLE. *v. n.* (from *top.*) To fall forward; to tumble down (*Shakspeare*).

TO′PPROUD. *a.* (*top* and *proud.*) Proud in the highest degree (*Shakspeare*).

TOPSAI′L. *s.* (*top* and *sail.*) The highest sail (*Knolles*).

TOPSHAM, a town in Devonshire, with a market on Saturday. It is seated on the Ex, five miles S.E. of Exeter (of which it is the port), and 170 S.W. of London. Lon. 3. 26 W. Lat. 50. 39 N.

TOPSYTU′RVY. *ad.* With the bottom upward (*Swift*).

TOR. *s.* (toꞃ, Saxon.) 1. A tower; a turret. 2. A high pointed rock or hill: whence *tor* in the initial syllable of some local names.

TOR, or ELTOR, a town of Arabia Petrea, seated on the Red Sea, with a good harbour defended by a castle. Here is a Greek convent, in the garden of which are fountains of bitter water, pretended to be those which Moses rendered sweet, by throwing in a piece of wood. Lon. 33. 45 E. Lat. 28. 27 N.

TORBAY, a bay of the English Channel, on the coast of Devonshire, to the E. of Dartmouth, formed by two capes, called Bury-

Point and Bob's Nose. It was here the prince of Orange landed in November 1688, when he came over from Holland, by the invitation of many principal persons, to preserve us from popery and arbitrary power.

TORCELLO, a town of Italy, in the territory of Venice. It is thin of people on account of the unwholesome air, and seated in a small island, seven miles N. of Venice. Lon. 12. 9 E. Lat. 45. 32 N.

TORCH, a factitious luminary used in several church ceremonies, funerals, &c.; a flambeau.

Torch-bearer. *s.* One whose office it is to carry a torch.

Torch thistle, in botany. See Cactus.

TORCHENESS, in the manage, a long stick with a hole at the end of it. Through this runs a strap of leather, the two ends of which being tied together, serve closely to tie up a horse's nose, as long as the stick is kept upon the halter or snaffle. This is done to keep the horse from being unruly when dressed, or upon any other occasion.

TO'RCHER. *s.* (from *torch.*) One that gives light (*Shakspeare*).

TO'RCHLIGHT. *s.* (*torch* and *light.*) Light kindled to supply the want of the sun (*Bacon*).

TORCULAR HEROPHILI. (from *torqueo*, to twist.) The press of Herophilus. That place where the four sinusses of the dura mater meet together, first accurately described by Herophilus, the anatomist.

TORDA, or Torenburg, a town of Transylvania, famous for its salt-works. The Hungarian language is said to be spoken with the greatest purity in this town. It is 15 miles W.N.W. of Clausenburg, and 48 N.W. of Hermanstadt. Lon. 23. 13 E. Lat. 46. 50 N.

Torda, in ornithology. See Alca.

TORDESILLAS, a fortified town of Spain, in Leon, with a magnificent palace, where queen Joan, mother of Charles V. ended her melancholy days. It is seated in a country fertile in corn and wine, on the river Douero, 24 miles W. of Valladolid, and 75 S. E. of Leon. Lon. 4. 56 W. Lat. 41. 48 N.

TORDYLIUM. Hart-wort. In botany, a genus of the class pentandria, order digynia. Involucres long, undivided; flowers radiate, all hermaphrodite; fruit suborbicular, compressed, with a crenate margin. Six species; chiefly natives of the south of Europe, Levant, or Syria; two common to our own country. Tordylium officinale, common hart-wort; involucres as long as the flowers; leaves ovate, cut, crenate; stem pubescent; found wild in our corn-fields: tordylium maximum, knotted parsley; umbels crowded, radiate; leaflets lanceolate, cut, serrate; stem rough, with deflected bristles. Found wild in our pastures.

TORE, the preterit, and sometimes participle passive of *tear*.

TORENIA, in botany, a genus of the class didynamia, order angiospermia. Calyx two-lipped; the upper lip slightly three-toothed: capsule two-celled, two-valved, hid in the calyx. Two species, both natives of India; one glabrous, with creeping stem; the other hairy, with erect stem.

TORGAU, a town of Upper Saxony, in Saxony Proper. It has a castle, the staircase of which is built in such a manner, that a person may ride in a chaise to the top of it. The inhabitants brew excellent beer, which they send to other places on the Elbe, on which the town is seated. Here the king of Prussia obtained a great victory over the Austrians in 1760. It is 27 miles N.E. of Leipsic, and 35 N. W. of Dresden. Lon. 13. 3 E. Lat. 51. 34 N.

TORIES, a political faction in Britain, opposed to the whigs. The name of tories was given to a sort of banditti in Ireland, and was thence transferred to the adherents of Charles I. by his enemies, under the pretence that he favoured the rebels in Ireland. His partisans, to be even with the republicans, gave them the name of whigs, from a word which signifies *whey*, in derision of their poor fare. The tories, or cavaliers, as they were also called, had then principally in view the political interests of the king, the crown, and the church of England; and the round-heads, or whigs, proposed chiefly the maintaining of the rights and interests of the people, and of protestantism. This is the most popular account; and yet it is certain the names whig and tory were but little known till about the middle of the reign of king Charles II. M. de Cize relates, that it was in the year 1678 that the whole nation was first observed to be divided into whigs and tories; and that on occasion of the famous deposition of Titus Oates, who accused the Catholics of having conspired against the king and the state, the appellation of whig was given to such as believed the plot real; and tory to those who held it fictitious.

These parties may be considered either with regard to the state or to religion. The state tories are either violent or moderate: the first would have the king to be absolute, and therefore plead for passive obedience, non-resistance, and the hereditary right of the house of Stuart. The moderate tories would not suffer the king to lose any of his prerogative; but then they would not sacrifice those of the people. The state whigs are either strong republicans or moderate ones. "The first," says Rapin, "are the remains of the party of the long parliament, who attempted to change monarchy to a commonwealth: but these make so slender a figure, that they only serve to strengthen the party of other whigs. The tories would persuade the world, that all the whigs are of this kind; as the whigs would make us believe that all the tories are violent. The moderate state whigs are much in the same sentiments with the moderate tories, and desire that the government may be maintained on the ancient foundation: all the difference is, that the first bear a little more to the parliament and people, and the latter to that of the king." In religion, the whigs lean towards a universal toleration, while the tories wish to restrict the principal immunities and honours to the members of the established religion.

To TO'RMENT. *v. a.* (*tourmenter*, Fr.) 1. To put to pain; to harass with anguish; to excruciate (*Shakspeare*). 2. To tease; to vex with importunity. 3. To put into great agitation (*Milton*).

To'RMENT. *s.* (*tourment*, French.) 1. Any thing that gives pain (*Matthew*). 2. Pain; misery; anguish (*Milton*). 3. Penal anguish; torture (*Dryden*).

TORMENTILLA. Tormentil. Septfoil. In botany, a genus of the class icosandria, order polygynia. Calyx eight-cleft, inferior; petals four; seeds roundish, naked, wrinkled, fixed to a small juiceless receptacle. Two species; both common to our own hedges.

1. T. reptans. Creeping tormentil. With prostrate, simple stem, leaves on footstalks.

2. T. erecta. Upright tormentil. Stem ascending, branched; leaves sessile. The root of this plant is used medicinally: it has a strong styptic taste, but imparts no peculiar sapid flavour: it has been long held in estimation as a powerful adstringent; and, as a proof of its efficacy in this way, it has been substituted for oak bark in the tanning of skins.

TORME'NTOR. *s.* (from *torment.*) 1. One who torments; one who gives pain (*Sidney*). 2. One who inflicts penal tortures.

TORMINA, in medicine. Gripes. Severe pains in the bowels.

TORN. The participle passive of *tear*.

TORNA, or TORNAW, a fortified town of Upper Hungary, capital of a county of the same name, with a castle. It is seated on an eminence, on the river Sayo, 22 miles W. of Cassovia. Lon. 20. 43 E. Lat. 48. 50 N.

TORNADO, a sudden and vehement gust of wind from all points of the compass, frequent on the coast of Guinea.

A tornado seems to partake much of the nature of a whirlwind, or perhaps of a waterspout, but is more violent in its effects. It commences very suddenly, several clouds being previously drawn together, when a spout of wind, proceeding from them, strikes the ground in a round spot of a few rods or perches diameter, and proceeds thus half a mile or a mile. The proneness of its descent makes it rebound from the earth, throwing such things as are moveable before it, but some sideways or in a lateral direction from it. A vapour, mist, or rain, descends with it, by which the path of it is marked with wet.

TORNE, a river of Sweden, which rises in the mountains of Norway, forms a lake of the same name, and flowing S. E. falls into the gulf of Bothnia, at Tornea.

TORNEA, a town of Sweden, in West Bothnia, capital of a territory of the same name, with a good harbour. It is a place of some trade, because all the Laplanders in those parts come and exchange their skins and other articles, for what they want. The houses are low, and the cold so severe, that sometimes people lose their fingers and toes. It is seated at the mouth of the Torne, at the N. extremity of the gulf of Bothnia, 180 miles N.E. of Uma, and 420 N.N.E. of Stockholm. Lon. 24. 17 E. Lat. 65. 51 N.

TORNOVA, a town of Turkey in Europe, in Jama, with a bishop's see. It is seated at the foot of mount Dragoniza, on the river Salempria, 10 miles N.W. of Larissa. Lon. 22. 36 E. Lat. 39. 52 N.

TOROSE, in botany. Torosus. Protuberant, swelling out in knobs; like the veins and muscles. Applied to some siliques; and other pericarps, as lycopersicum, phytolacca.

TORPEDO, the cramp-fish. See RAIA.

TO'RPENT. *a.* (*torpens*, Latin.) Benumbed; struck motionless; not active (*Evelyn*).

TO'RPID. *a.* (*torpidus*, Latin.) Numbed; motionless; sluggish; not active (*Ray*).

TO'RPIDNESS. *s.* (from *torpid.*) The state of being torpid (*Hale*).

TO'RPITUDE. *s.* (from *torpid.*) State of being motionless; numbness (*Derham*).

TO'RPOR. *s.* (Latin.) Dulness; numbness; inability to move; dulness of sensation.

TORREFA'CTION. *s.* (*torrefaction*, Fr.) The act of drying by the fire (*Boyle*).

To TO'RREFY. *v. a.* (*torrefier*, French; *torrefacio*, Latin.) To dry by the fire (*Brown*).

TO'RRENT. *s.* (*torrent*, French; *torrens*, Latin.) 1. A sudden stream raised by summer showers (*Sandys*). 2. A violent and rapid stream; tumultuous current (*Clarendon*).

To'RRENT. *a.* (*torrens*, Latin.) Rolling in a rapid stream (*Milton*).

TORRES, a seaport of Spain, in Granada, seated on the Mediterranean, 45 miles S.W. of Granada. Lon. 3. 56 W. Lat. 36. 39 N.

TORRES NOVAS, a strong town of Portugal, in Estremadura, with a castle. It is surrounded by walls, and seated in a fertile plain, on the river Almonda, 55 miles N. E. of Lisbon. Lon. 8. 8 W. Lat. 39. 10 N.

TORRES VEDRAS, a town of Portugal, in Estremadura, with a castle, seated near the Atlantic, in a country abounding in corn, fruits, and good wine, 17 miles S. of Lisbon.

TORRICELLI (Evangeliste), in biography, an illustrious mathematician and philosopher of Italy, was born in 1608, and trained up in the knowledge of classical literature. The bent of his mind, however, led him to the pursuits of natural philosophy, which he studied under father Benedict Castelli, who had been the scholar of the great Galileo, and was professor of mathematics at Rome. Torricelli made such progress under this master, that having read Galileo's Dialogues, he composed a Treatise concerning Motion, upon his principles. Castelli, surprised at the performance, carried it and read it to Galileo, who heard it with great pleasure, and conceived a high esteem and friendship for the author. Upon this, Castelli proposed to Galileo, that Torricelli should come and live with him; recommending him as the most proper person he could have, since he was the most capable of comprehending those sublime speculations which his own great age, infirmities, and want of sight, prevented him from giving to the world. Galileo accepted the proposal, and Torricelli the employment, as things of all others the most advantageous to both. Galileo was at Florence, at which place Torricelli arrived in 1641, and began to take down what Galileo dictated, to regulate his papers, and to act in every respect according to his directions. But he did not long enjoy the advantages of this situation, as Galileo died at the end of only three months. Torricelli was then about returning to Rome; but the grand duke engaged him to continue at Florence, making him his own mathematician for the present, and promising him the professor's chair as soon as it should be vacant. Here he applied himself intensely to the study of mathematics, physics, and astronomy, making many improvements, and some discoveries. Among others, he greatly improved the art of making microscopes and telescopes; and it is generally acknowledged that he first found out the method of ascertaining the weight of the atmosphere by a proportionate column of quicksilver, the barometer being called from him the Torricellian tube, and the experiment with that tube the Torricellian experiment. Great things would probably have been further performed by him, if he had lived; but he died, after a few days illness, in 1647, when he was but just entered the 40th year of his age. His principal work was entitled Opera Geometrica, in 4to.

TORRICELLIAN EXPERIMENT, a famous experiment made by Torricelli, by which he demonstrated the pressure of the atmosphere, in opposition to the doctrines of suction, &c. finding that pressure able to support only a certain length of mercury, or any other fluid, in an inverted glass tube. See Barometer and Pneumatics.

TO'RRID. *a.* (*torride*, French; *torridus*, Latin.) 1. Parched; dried with heat (*Harvey*). 2. Burning; violently hot (*Milton*). 3. It is particularly applied to the region or zone between the tropics. See Zone.

TORRINGTON, a corporate town in Devonshire, with a market on Saturday. It has two churches, a manufacture of stuffs, and is governed by a mayor. Some remains of a castle are still visible. It is seated on the Towridge, over which is a bridge, 11 miles S. by W. of Barnstaple, and 194 W. by S. of London. Lon. 4. 0 W. Lat. 51. 4 N.

TO'RSEL. *s.* (*torse*, French.) Any thing in a twisted form.

TO'RSION. *s.* (*torsio*, Latin.) The act of turning or twisting.

TORSK, in ichthyology. See Gadus.

TORT. *s.* (*tort*, French; *tortum*, low Latin.) Mischief; injury: obsolete (*Fairfax*).

TO'RTILE. *a.* (*tortilis*, Latin.) Twisted; wreathed.

TO'RTION. *s.* (from *tortus*, Latin.) Torment; pain: not in use (*Bacon*).

TO'RTIOUS. *a.* (from *tort.*) Injurious; doing wrong (*Spenser*).

TO'RTIVE. *a.* (from *tortus*, Latin.) Twisted; wreathed (*Shakspeare*).

TORTOISE, in amphibiology. See Testudo.

Tortoise-shell, the hard, horny covering of the tortoise, turtle, or testudo; used in inlaying, and for various other ornamental works, as combs, snuff-boxes, &c. Tortoise-shell appears to be formed, as far as organic arrangement is concerned, in the way of stratum superstratum; and this kind of structure is particularly to be discovered after long maceration in diluted nitric acid; for the shell appears then to be evidently composed, like the black, polished gorgonia, of membranaceous laminæ, while the varieties of horn differ only by a tendency to the fibrous organization.

On chemical analysis, five hundred grains of tortoise-shell have been found to yield eighty grains of coal; from which three grains of earthy matter being deducted, the actual result will be seventy-seven grains of coal. These three grains consisted of phosphat of soda and lime, with slight traces of iron: but Mr. Hatchett, who made the experiment, thinks it probable that the latter was accidentally present. Catesby has justly observed, that the hard strong covering which incloses all sorts of tortoises is very improperly called a shell; being somewhat of a bony contexture, but covered on the outside with scales, or rather plates of a horny substance; which are what workmen call tortoise-shell. See Horn.

There are two general kinds of tortoises, viz. the land and sea tortoise, testudo terrestris and marina. The sea-tortoise, again, is of several kinds; but it is the testudo imbricata of Linnéus alone which furnishes that beautiful shell so much admired in Europe. See Testudo.

The whole spoils of the tortoise consist in thirteen leaves or scales, eight of them flat, and five a little bent. Of the flat ones, there are four large ones, sometimes a foot long, and seven inches broad. The best tortoise-shell is thick, clear, transparent, of the colour of antimony, sprinkled with brown and white. When used in marquetry, &c. the workmen give it what colour they please by means of coloured leaves, which they put underneath it.

Working and joining of tortoise-shell.—Tortoise-shell and horn become soft in a moderate heat, as that of boiling water, so as to be pressed in a mould, into any form, the shell or horn being previously cut into plates of a proper size. Plumier informs us, in his Art de Tourner, that two plates are likewise united into one by heating and pressing them; the edges being thoroughly cleaned, and made to fit close to one another. The tortoise-shell is conveniently heated for this purpose by applying a hot iron above and beneath the juncture, with the interposition of a wet cloth to prevent the shell from being scorched by the irons: these irons should be pretty thick, that they may not lose their heat before the union is effected. Both tortoise-shell and horns may be stained of a variety of colours, by means of the colouring drugs commonly used in dyeing, and by certain metallic solutions.

TORTOLA, the principal of the Virgin Islands, in the West Indies, 18 miles long and seven broad. It formerly belonged to the Dutch, who built a strong fort, from which they were expelled by the English in 1666. It produces excellent cotton, sugar, and rum; and of late years has undergone great improvements. Its fruits, of which there are no great variety, are but indifferent; some apples excepted. The entrance into the harbour is at the E. end of the island. Lon. 63. 0 W. Lat. 18. 33 N.

TORTONA, a fortified town of Italy, in the duchy of Milan, capital of the Tortonese, with a bishop's see, and a castle on an eminence. It is deemed a considerable frontier place; was taken by the allies in 1744, by the Spaniards in 1745, and by the French in 1796. It is seated on the Scrivia, 28 miles S. E. of Casal, and 27 S.W. of Milan. Lon. 8. 58 E. Lat. 45. 8 N.

TORTOSA, a city of Spain, in Catalonia, with a bishop's see, a university, and a citadel. It is divided into the Old and New Town, both surrounded by modern fortifications. The entrance is over a large bridge of boats, on the river Ebro, whose head is fortified. It has a great number of churches and religious houses; among which the cathedral, the royal college of Dominicans, and the convent of the Carmelites, are the most remarkable. It is situate in a country fertile in corn and fruits, and abounding with quarries and mines of silver, iron, alabaster, jasper of divers colours, and stones with veins of gold. Here is a great deal of silk and oil, and very fine potters ware, which resembles porcelain. It is seated partly on a plain, and partly on a hill, 35 miles S.W. of Tarragona, and 180 E. of Madrid. Lon. 0. 35 E. Lat. 40. 53 N.

TORTRIX, in the entomology of Gmelin, a tribe of the genus Phalæna, which see.

TORTUGA, an uninhabited island near the coast of Terra Firma, 40 miles W. of the island of Margaretta, and about 30 miles in circumference. The E. end is full of bare, rugged, broken rocks, which stretch a little way out to sea. At this end is a large salt pond, where the salt begins to kern in April; and there have been 20 ships here at a time for salt. At the W. end is a small harbour with fresh water; and it is full of low trees. There are a few goats on it; and the turtles or tortoises come upon the sandy banks to lay their eggs, whence this island has its name. It was formerly much frequented by the bucaniers. Lon. 64. 50 W. Lat. 11. 30 N.

Tortuga, an island of the West Indies, near the N. coast of the island of Hispaniola, where the French bucaniers used to fortify themselves. It is about 80 miles in circumference, and has a safe harbour, but difficult of access. Lon. 75. 10 W. Lat. 20. 10 N.

TORTULA, in botany, a genus of the class cryptogamia, order musci. Capsule cylindrical; fringe simple, of numerous capillary teeth spirally twisted together. Twenty-nine species; eighteen common to our own country.

TORTUO'SITY. *s.* (from *tortuous.*) Wreath; flexure (*Brown*).

TO'RTUOUS. *a.* (from *tortuosus*, Latin.) 1. Twisted; wreathed; winding (*Boyle*). 2. (from *tort.*) Mischievous (*Spenser*).

TO'RTURE. *s.* (*tortura*, Latin.) 1. Torments judicially inflicted; pain by which guilt is punished, or confession extorted (*Dryden*). 2. Pain; anguish; pang (*Shakspeare*).

To To'rture. *v. a.* (from the noun.) 1. To punish with tortures (*Milton*). 2. To vex; to excruciate; to torment (*Addison*). 3. To keep on the stretch (*Bacon*).

TO'RTURER. *s.* (from *torture.*) He who tortures; tormentor (*Shakspeare*).

TO'RVITY. *s.* (*torvitas*, Latin.) Sourness; severity of countenance.

TORULOUS, in botany. (from *torous.*) Swelling a little.

TO'RVOUS. *a.* (*torvus*, Latin.) Sour of aspect; stern; severe of countenance.

TORUS, in architecture, a large round moulding used in the bases of columns.

TORY. See Tories.

TOSA, a seaport of Spain, in Catalonia, seated at the bottom of a bay, which forms a good harbour, where vessels are sheltered from all winds except the S.W. It is built partly on a plain, and partly on a steep hill, which projects into the sea. On the top of the hill, nearer the sea, is a strong citadel, with other fortifications. It is 37 miles N.E. of Barcelona. Lon. 2. 54 E. Lat. 41. 42 N.

TOSCANELLA (Paul), an astronomer, who erected in Florence cathedral a famous gnomon, of which a description has been published by Ximenes, in 4to. 1757. Some suppose that Toscanella formed an idea of the possibility of a passage to the East by the Cape of Good Hope, and by mentioning the circumstance to Martenz of Lisbon, the Portuguese, it is said, were animated in making discoveries. He died about 1490.

To TOSE. *v. n.* (of the same original with *tease.*) To comb wool.

To TOSS. *v. a.* preterit and part. pass. *tossed* or *tost.* (*tosen*, German, to make a noise.) 1. To throw with the hand, as a ball at play (*Dryden*). 2. To throw with violence (*Woodward*). 3. To lift with a sudden and violent motion (*Addison*). 4. To agitate; to put into violent motion (*Proverbs*). 5. To make restless; to disquiet (*Milton*). 6. To keep in play; to tumble over (*Ascham*).

To Toss. *v. n.* 1. To fling; to winch; to be in violent commotion (*Addison*). 2. To be tossed (*Shakspeare*). 3. *To* Toss *up.* To throw a coin into the air, and wager on what side it will fall (*Bramston*).

Toss. *s.* (from the verb.) 1. The act of tossing (*Addison*). 2. An affected manner of raising the head (*Swift*).

TOSSEL. *s.* See TASSEL (*Mortimer*).

TO'SSER. *s.* (from *toss.*) One who throws; one who flings and writhes.

TO'SSPOT. *s.* (*toss* and *pot.*) A toper and drunkard.

TOST. The preterit and part. pass. of *toss.*

TOSTAR, or SUSTER, a town of Persia, capital of Kusistan, on the river Sable. It was once a celebrated city, where the kings of Persia had a magnificent palace, in which they deposited their archives and part of their treasure. In scripture it is called Shushan, and the river is named Ulai. At present here are manufactures of silks, stuffs, and rich cloth. It is 170 miles W.S.W. of Ispahan. Lon. 49. 2 E. Lat. 31. 30 N.

TOTA BONA. See BONUS HENRICUS.

TO'TAL. *a.* (*totus,* Latin; *total,* French.) 1. Whole; complete; full (*Prior*). 2. Whole; not divided (*Milton*).

TOTA'LITY. *s.* (*totalite,* French.) Complete sum; whole quantity.

TO'TALLY. *ad.* (from *total.*) Wholly; fully; completely (*Atterbury*).

T'OTHER. Contracted for *the other.*

TOTNESS, a borough in Devonshire, governed by a mayor, with a market on Saturday, and a manufacture of serges, &c. It had formerly a castle and walls, and two gateways are yet standing. It is seated on the river Dart, on the side of a hill, 27 miles S.W. of Exeter, and 196 W. by S. of London.

TOTTENHAM, a village in Middlesex, five miles N. of London. Here are three almshouses; one of them founded in 1596, by Balthazar Zanches, who was confectioner to Philip II. of Spain, and the first that exercised that art in this country.

To TO'TTER. *v. n.* (*tateren,* Dutch.) To shake so as to threaten a fall (*Dryden*).

TO'TTERY. To'TTY. *a.* (from *totter.*) Shaking; unsteady; dizzy (*Spenser*).

TOUCAN, in ornithology. See RAMPHASTOS.

To TOUCH. *v. a.* (*toucher,* French.) 1. To perceive by feeling (*Creech*). 2. To handle slightly (*Brown*). 3. To reach with any thing, so as that there be no space between the thing reached and the thing brought to it (*Milton*). 4. To come to; to attain (*Pope*). 5. To try, as gold with a stone (*Shakspeare*). 6. To relate to (*Hooker*). 7. To meddle with (*Spenser*). 8. To effect (*Milton*) 9. To move; to strike mentally; to melt (*Congreve*). 10. To delineate or mark out (*Pope*). 11. To censure; to animadvert upon (*Hayward*). 12. To infect; to seize slightly (*Bacon*). 13. To bite; to wear; to have an effect on (*Moxon*). 14. To strike a musical instrument (*Pope*). 15. To influence by impulse; to impel forcibly (*Milton*). 16. To treat of perfunctorily (*Milton*). 17. To TOUCH *up.* To repair, or improve by slight strokes (*Addison*).

To TOUCH. *v. n.* 1. To be in a state of conjunction so that no space is between them. 2. To fasten on; to take effect on (*Bacon*). 3. *To* TOUCH *at.* To come to without stay (*Cowley*). 4. *To* TOUCH *on.* To mention slightly (*Addison*). 5. *To* TOUCH *on* or *upon.* To go for a very short time (*Dryden*). 6. *To* TOUCH *on* or *upon.* To light upon in mental inquiries (*Addison*).

TOUCH. *s.* (from the verb.) 1. Reach of any thing so that there is no space between the things reaching and reached (*Milton*). 2. The sense of feeling (*Davies*). 3. The act of touching (*Milton*). 4. The state of being touched (*Shakspeare*). 5. Examination, as by a stone (*Hayward*). 6. Test; that by which any thing is examined (*Carew*). 7. Proof; tried qualities (*Shakspeare*). 8. (*touche,* French.) Single act of a pencil upon the picture (*Dryden*). 9. Feature; lineament (*Shakspeare*). 10. Act of the hand upon a musical instrument (*Milton*). 11. Power of exciting the affections (*Shakspeare*). 12. Something of passion or affection (*Hooker*). 13. Particular relation (*Bacon*). 14. A stroke (*Swift*). 15. Animadversion; censure (*K. Charles*). 16. Exact performance of agreement (*More*). 17. A small quantity intermingled (*Holder*). 18. A hint; slight notice given (*Bacon*). 19. A cant word for a slight essay (*Swift*).

TOUCH, in music. A word applied to the resistance made to the fingers by the keys of an organ, harpsichord, or piano-forte. When the keys are put down with difficulty, the instrument is said to have a heavy touch; when a little pressure is sufficient, it is said to have a soft or light touch.

TOUCH. Tactus. The sensation by which we perceive any thing that is applied to the skin. The organ of touch is formed by the nervous papillæ, which are situated all over the skin, but more especially at the points of the fingers.

Touch is understood in a twofold manner. For by this term, in general, we call every change of the nerves, arising from heat, cold, roughness, smoothness, weight, moisture, or dryness in external bodies, in whatever part of the body that change may arise. In this acceptation, touch is ascribed to almost all parts of the human body, in a greater or less degree; as in different places of the body the nerves are more numerous, bare, or covered with thinner membranes; and in this sense pain, pleasure, hunger, thirst, anxiety, itching, and the other sensations, belong to the sense of touch.

But, in a somewhat different and more proper acceptation, the sense of touch is said to be the change from external bodies which is produced in the skin, more especially at the ends of the fingers, and is represented to the mind. For by the fingers we most accurately distinguish the tangible qualities of bodies.

Indeed, in the skin we do not easily distinguish any particle which does not feel. But since the touch is commonly ascribed in a peculiar manner to the papillæ, the structure of the skin must be described. What is strictly called the skin, is composed of a dense web of very compact cellular substance, whose fibres are intermixed and interwoven, which renders it highly extensible, contractile, and porous. Its strata which are exposed to the air, and next to the epidermis, are more closely compacted; as they approach the fat they are gradually relaxed, and resolved into a softer cellular texture. It is more tender in some places, and in others firmer. It is pervaded by many small arteries, which come from the subcutaneous ones: they are neither large nor long, but are numerous in some parts where the skin is red, as in the cheeks; in other parts they are fewer in number. The veins arise in great numbers from the subcutaneous reticulations: the nerves likewise in the skin are very numerous; but they vanish so suddenly, that it is very difficult to trace their ultimate extremities. Betwixt the skin and muscles there is cellular substance, into which the skin insensibly resolved, degenerates, in most parts replenished with fat, of which the little eminences form pits in the skin; but in some parts, as the penis, red part of the lips, &c. it is destitute of fat. There are very few parts in the human body where muscular fibres are immediately contiguous to the skin, without any separation by fat; for the dartos is only cellular substance, and has no muscular fibres. There are some places where tendinous fibres are inserted into the skin; as in the palms of the hands and soles of the feet.

Throughout the skin in general, in most parts of the body of man or of the larger animals, on removing the epidermis, scarcely an unevenness is perceptible, unless very minute granulations, raised hardly any visible height, and obtuse. But in the ends of the fingers, papillæ, somewhat larger, but still very difficult of demonstration to the sight, are seated in cavities of the cuticle, and receive nerves scarcely visible: they are minute projections, formed of vessels with one or more small nerves, wrapped up in cellular substance. In the lips, after maceration, they appear long and villous; in the penis they are flaky; and in the tongue they are most evident, from the fabric of which we conclude, by analogy, with respect to the other cutaneous papillæ.

The skin is surrounded by another covering, which resists completely the action of the air, and which coheres with the skin by an infinite number of small vessels, and by hairs passing through it. The outer surface of this covering, of a corneous nature, dry, insensible, not subject to putrefaction, destitute of vessels and nerves, wrinkled in a particular manner, and reticular towards the skin, is called the epidermis. It is perforated by an infinite number of pores, of which the larger ones are perspirative, and the smaller vaporiferous, and is connected with the skin by numerous minute vessels resembling down. By pressure or burning, the cuticle grows thicker, by the addition of new plates, formed between it and the skin, and is then said to be callous. But even without disease, in negroes the two plates are distinct.

The inner surface of the cuticle, more soft, pulpy, half fluid, resembling concreted mucus, is separated with difficulty in Europeans, but easily in the African negro, in whom it is truly membranaceous, solid, and separable; and in the palate of brutes. It is incumbent on the skin, of which it receives the papillæ into soft pits. It is called the rete Malpighianum, although it be certain that it is not perforated in a conspicuous manner, as a sieve.

That this reticular body is composed by the concretion of some fluid transuding from the skin, seems very probable. The fabric of the cuticle is still uncertain; for since it is destitute of vessels, is regenerated, and is insensible, it does not seem to belong to the organical parts of the body. Is it the outer part of the Malpighian mucus, coagulated and condensed by the air and by pressure, which is perforated in many places by exhaling and inhaling ducts, the mouths of which are cemented together by the interposed condensed glue? Is this opinion supported by the mucous expansion upon the membrane of the tympanum? by its dissolution in water, as observed by eminent anatomists, though by others denied, in the cuticle of negroes? See SKIN.

Moreover, to the history of the skin belong the simple glands, which are seated in very many places under the skin in the cellular substance, and perforate it by their excretory ducts, and pour out upon the cuticle, in the hairy scalp, and in the convex surface of the ear, a fat soft half fluid liniment. Other sebaceous glands, partly simple and partly compound, generate in the face, though more slowly, a dry white liniment, but in the groins and armpits one more oily, with which the skin being anointed, shines, and is defended both from the air and from friction. They are found in all parts of the human body that are under the necessity of being more immediately exposed to the air, as in the face, where there are a great number of the compound sort; or wherever the skin is liable to great friction, as in the breasts, arm-pits, groins, glans penis, nymphæ, anus, and hams. They frequently send out hairs. Are follicles of this kind seated in all parts of the skin? Although anatomy does not demonstrate them, yet it seems probable that they are present every where, as appears from the sordes collected about the whole surface of the body seemingly of the sebaceous kind. But another sort of oily ointment is poured out upon the skin, through its pores, from the fat itself, without the intervention of glands, especially where the skin is clothed with hair.

The hair and nails are also appendages to the skin. The former are scattered over almost the whole surface of the body, the palms of the hands and soles of the feet excepted; in most parts short and soft; but longer upon the skin of the head, cheek, chin, and breast in men; also, upon the fore-part of the limbs, in the arm-pits, groins, and pubis. They arise from the subcutaneous cellular substance, originating from a little bulb, which is membranous, strong, vascular, of an oval shape, and more lax towards the cellular texture, at which part it is also furnished with vessels; in which little bulb another bulb lies hid, roundish at its beginning, but afterwards cylindrical, and surrounded with blood. In this second bulb lies the hair, covered with a fatty humour. The hair, with both its cylindrical sheaths, arrives at a cutaneous pore, goes out through it, and forces the epidermis into a similar sheath; whence the very great stability of the hair: after this the sheath cannot be any longer separated from the cortex; the filaments, and spongy and cellular matter, are continued throughout the whole length of the hair. The hairs grow naturally in the subcutaneous cellular substance; but, by disease, they are sometimes formed in other situations within the fat. They grow continually; and, when cut, are renewed by the protrusion of their medullary substance from the skin outwardly, and by the prolongation of the cuticle. In old age, the hairs, destitute of this medulla, dry up, split, and fall off. Their colour is from the juice, which fills the internal cellular texture. They seem to exhale through their extremities, and possibly throughout their whole surface, as we may conclude from the constant protrusion of their medulla, which ought to have an end, from the plica polonica, and from the luminous rays that come out from the hairs of an animal electrified. The subcutaneous fat follows the course of the hairs, and is exhaled.

The nails are of the nature and fabric of the cuticle, and fall off along with it, being in like manner insensible, and capable of reproduction. They are found upon the ends of the fingers and toes, occupying their upper and back part, and correspond to the tactile papillary apex, which they support, and retain applied to the object felt. They arise from a square root, between an internal stratum of the skin, mixed with periosteum, and another external stratum, a little beyond the last articulation: they go out by a lunar cleft in the external plate of the skin, where the cuticle partly returns back towards the root of the nail, to which it adheres, and is partly laid over the outside of the nail, and extended forward with it, forming its outward covering. The nail itself is soft when it is first produced, and in the part covered by the skin; but, by age, and contact with the air, it becomes harder, corneous, solid, and elastic, composed of long fibres cemented by gluten, separated by sulci, fissile, and of many layers. The nail thus formed, extends itself to the extremity of the finger; and, through its whole extent, its internal striated surface is lined by furrowed skin, blended with periosteum, of which the filaments are first short, afterwards longer, and those which adhere near the point of the nail are the longest of all. These are most intimately connected with the root of the nail. Beyond the adhering part of the nail, the skin again becomes free and unconnected with the nail, and has its own epidermis. A furrowed net-work is interposed betwixt the skin and nail, which is separable and soft, for the protection of the papillæ; where the furrows are, it becomes gradually harder, so that at last it can scarcely be distinguished from the nail. The tendons do not reach so far as the nail.

The subcutaneous cellular substance in very few places is without fat, on account of the necessary motion of the skin. Where it is replenished with fat, it defends the warmth of the internal parts from the air; it renders the skin moveable upon the muscles; it fills up the cavities between the muscles themselves; and contributes to the whiteness and beauty of the body. The skin, Malpighian mucus, and cuticle, not only cover the external surface of the body every where, but likewise, where they seem to be perforated; returning inwards, they gradually change their appearance. For the cuticle is manifest in the anus, urethra, vagina, cornea of the eye, auditory passage, mouth, and tongue; nor is it wanting even in the stomach itself and intestines; although, by the perpetual emollition, its fabric be altered, and relaxed into their villous coat. Thus the true skin, being continuous with the internal fabric of the palate, tongue, pharynx, nostrils, vagina, &c. changes every where into the white, thick, pulpy, commonly called nervous, coat of those parts.

What has been hitherto advanced is sufficient to enable us to understand the nature of touch. The papillæ at the ends of the fingers, somewhat larger in the inside, beautifully disposed in spiral folds, probably somewhat erected by the attention of the mind, as appears from shiverings, from the nipples of women, from the prolapsus of an intestine, from the handling of tangible objects, and from gentle friction, receive the impression of the object on their nervous fabric, and transmit it to the trunks of the nerves, and to the brain. This is the sense of touch. It enables us to distinguish chiefly the roughness of objects; and has been possessed to so exquisite a degree by some persons, that they have been known to distinguish coloured surfaces by the touch alone. We perceive heat, when external bodies are warmer than our fingers; and weight likewise, when they gravitate more in comparison with their bulk than usual. Humidity we judge of by the presence of adhering water; softness, by the yielding of the object; hardness, by the yielding of the finger: figure, by the hard limits circumscribing them; distance, by an inaccurate calculation derived from experience, to which the length of the arm serves as a measure, &c. Touch corrects the errors of our other senses, although it sometimes errs itself, and though other senses, independent of touch, furnish animals with just perceptions.

The mucous body of Malpighius moderates the action of the object touched, and preserves the integrity and softness of the papillæ. The cuticle excludes the air from the destructible skin; moderates the impressions of bodies, so that they may be only sufficient to effect the touch without causing pain: and, therefore, when thickened by use, the sense of feeling is lost; but, if it be too soft, the touch becomes painful. The hairs defend the cuticle from friction, generate and preserve the heat, conceal some parts, and render the membranes of others irritable, which require to be defended against the entrance of insects; and perhaps they excrete something excrementitious, and afford a passage to the exhaled oil. The nails are subservient to the touch, by resisting the object touched so as to prevent the papillæ from yielding, and being bent back; they increase the power of apprehension, and assist in the handling of minute objects. In most animals, they serve as weapons of offence; and would be of the same use to man, if they were not cut.

These are not all the uses of the skin: for a most important office of that covering is to exhale from the body a large quantity of humours, and to absorb others from the air. For which see PERSPIRATION.

TOU'CHABLE. *a.* (from *touch.*) Tangible; that may be touched.

TOUCH-HOLE. *s.* (*touch* and *hole.*) The hole through which the fire is conveyed to the powder in the gun (*Bacon*).

TO'UCHINESS. *s.* (from *touching.*) Peevishness; irascibility (*King Charles*).

TO'UCHING. *preposition.* With respect, regard, or relation to (*Hooker*).

TO'UCHING. *a.* (from *touch.*) Pathetic; affecting; moving.

TO'UCHINGLY. *ad.* With feeling emotion; in a pathetic manner (*Garth*).

TOUCH-ME-NOT. See NOLI ME TANGERE, IMPATIENS, and MOMORDICA.

TOUCHNEEDLE, among assayers, refiners, &c. little bars of gold, silver, and copper, combined together in all the different proportions and degrees of mixture; the use of which is to discover the degree of purity of any piece of gold or silver, by comparing the mark it leaves on the touchstone with those of the bars.

The metals usually tried by the touchstone are gold, silver, and copper, either pure, or mixed with one another in different degrees and proportions, by fusion. In order to find out the purity or quantity of baser metal in these various admixtures, when they are to be examined, they are compared with these needles, which are mixed in a known proportion, and prepared for this use. The metals of these needles, both pure and mixed, are all made into laminæ or plates, one-twelfth of an inch broad, and of a fourth part of their breadth in thickness, and an inch and a half long; these being thus prepared, you are to engrave on each a mark indicating its purity, or the nature and quantity of the admixture in it.

TO'UCHSTONE. *s.* (*touch* and *stone.*) 1. Stone by which metals are examined. See LAPIS LYDIUS. 2. Any test or criterion (*Dryden*).

TOUCHWOOD. Rotten wood, spunk, and agaric, that easily catch fire.

TOUCHWOOD TINDERBOX. The most inflammable touchwoods we are acquainted with are different species of the fungus called BOLETUS, which see, as B. igniarius, touchwood-spunk, and B. pini laricis, agaric: and a very curious fact has been lately discovered by the French chemists, in consequence of this combustibility, and which may lead to useful and important purposes: it is, that if a column of the flesh of either of the above species of boletus (spunk or touchwood) be introduced into a syringe, and pressed upon by its common piston, closing with great accuracy, it will catch fire from the mere compression of the column of air forced down upon it, and form a most convenient and ready tinderbox.

These machines, under the name of pneumatic, spunk, or touchwood tinderboxes are now common in France; and their origin, principle, and construction, have been so fully investigated and explained by M. Le Bouvier Desmortiers, in vol. lxvii. of the Journal de Physique, that we feel it our duty to copy at some length the paper for the information of our readers.

"The inflammation of spunk in the pneumatic tinderbox, by the compression of air alone, is a phænomenon, with which chance, the father of discovery, has lately enriched natural philosophy. Many have reasoned on its cause; which some consider to be caloric, others electricity; but no one, that I know of, has attempted to support his opinion by experiments. Without bias of any hypothesis, I have made some researches on the construction and effects of the pneumatic tinderbox, the results of which shall be the subject of the present paper. In the first part, I shall consider what relates to the structure of the instrument; in the second, I shall give an account of the experiments that tend to the discovery of the cause of its effects.

"I. The first construction of these tinderboxes was a little faulty in the piston being commonly eighteen or twenty lines long. This was said to be necessary, that the air might not escape when the piston was in action; for if there were any point not accurately fitted to the inside of the tube, the air escapes, and the spunk does not kindle.

"The goodness of the instrument does not depend on the length of the piston, but on the accuracy with which it fills the bore of the tube; with a tube well bored and a piston of six lines, the air will no more pass than with a piston of twenty. Accordingly, for a tube of six inches I have reduced the piston to six lines, which adds an inch to the column of air, and diminishes the friction two-thirds, so that the effect of the tinderbox is more certain, and it is more easily used. With a little dexterity you may kindle the spunk by holding the tube in one hand and pushing the piston with the other, without being obliged to rest it on a table, or any other solid body. Mr. Dumotiez, a skilful maker of philosophical instruments, is so fully convinced of the advantage of short pistons, that he now makes them of these dimensions.

"They should be employed also in the

syringes of air-guns, of fountains acting by compressed air, of the apparatus for artificial mineral waters, of fire-engines, which are worked with so much labour, and even of air-pumps. As the shortening the piston is an advantage to the pump, we obtain a greater effect with less labour, and in a shorter time, than with long pistons.

"It is essential too, that the instrument does not leak at the part where the spunk is placed, because there the transient action of inflammation takes place, and a slight emission of air would prevent the effect. But this effect is produced, though the piston does suffer the air in the tube to pass it. To satisfy myself of this, I made the following experiment, at which they who have seen it were greatly surprised.

"In the length of the piston I made a groove a quarter of a line broad. The spunk took fire as before. Three other grooves were added successively opposite one another, so as to divide the piston into four equal parts; and still the spunk took fire. When the grooved piston is moved backwards and forwards in the tube, the air may be heard entering or issuing out; and the friction is so slight, that the effect of the instrument is easily obtained by pushing it with the hand. This kind of piston would be preferable to those that fit accurately, if a solid substance were employed, hard enough to resist the continual friction of the air passing through the grooves, if I may be allowed the expression. The grooves in leather pistons soon alter their shape, and spread so as to allow the air to pass in too large quantity.

"The piston with four grooves acting very well, I made one with a single groove, of dimensions equal to the other four, and what I foresaw actually took place: there was no inflammation. The following are the reasons of this difference.

"The extremity of the grooved piston exhibits the area of a circle, the periphery of which touches the interior edge of the grooves. The column of air contained in the tube rests almost wholly on this base. There are only the parts corresponding to the grooves, that are continued through the length of the piston, and communicate with the external air. When the piston is pushed with sufficient velocity to kindle the spunk, the parts of the column corresponding to the grooves rush into them with equal velocity; but the friction they experience in passing through such narrow tubes occasions a resistance to their passage, a kind of choking, that suffers only a part to escape, while the column resting on the area of the piston is pushed entirely toward the extremity of the tube, where the spunk to be kindled lies.

"In the piston with a single broad groove, the area of the circle, on which the column of air rests, is much smaller, consequently the column itself is less. The resistance the air experiences in passing through the groove is next to nothing; for we hear no noise on moving the piston backward and forward; and as air expands in all directions; when the piston is moved, the column resting on the area of the circle, resting at the same time laterally on that which answers to the groove, it recedes from all the points of contact, and flows entirely through the channel it finds opens. It is so true, that it wholly flows out, that the piston, when it touches the extremity of the tube, remains there; while with other pistons a sufficient quantity of air is retained to occasion a spring and repel them.

"I think it proper to say a word or two on the quality of the spunk. The driest, softest, and least impregnated with nitre, should be chosen. In that of the best quality a piece will not always be found equally good throughout. Some contains a great deal of nitre, and is kindled with more difficulty*. This may be known by the cool taste it leaves on the tongue; or by kindling it: for when it has taken fire the nitre melts, and sometimes throws out sparks, that may be dangerous when they spirt out of the instrument, particularly if made with a cock. As it is usual to blow on the spunk, to try whether it be kindled, a spark may be thrown from it into the eye. This painful accident once happened to me.

"They who imagine that electricity kindles the spunk consider these sparks as an incontrovertible proof of their opinion. I think they are mistaken in this case; yet I must not conceal a fact communicated to me by Mr. Veau-Delaunay, which seems to confirm this opinion, of which he is a partisan. Out of twelve times, when he operated with the instrument without any spunk in it, he saw sparks emitted three times. There are strong reasons, however, for suspecting, that electricity is not the cause of the inflammation here. These I shall give in the second part of this paper, concluding the present with an important observation on the construction of pistons.

"If we could find an elastic substance sufficiently compact to be turned in a lathe, we should have perfect pistons, that would spring and adapt themselves to the inequalities of the tube, without suffering a bubble of air to escape. I have made some with caoutchouc, softened before the fire, in order to give it a degree of elasticity more obedient to the inequalities of the tube. But on attempting to turn it in a lathe, it bent under the tool. Even the edge of a razor would not take hold of it; so that the piston remained uneven and almost ragged, and yielded like soft wax under the fingers. In this imperfect state it so far prevents the air from escaping, that a column of three inches is sufficient to kindle the spunk; but after a few strokes of the piston the heat dilates it to such a degree, that it cannot be moved without considerable force. If a drop of oil be put on it, it moves easily; but this soon spoils the instrument; for the oil dissolves the caoutchouc, and forms a varnish, which, as the piston grows hot, makes it adhere still more strongly to the sides of the tube.

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* The common spunk of the shops is prepared from agaric, which is first boiled in water; beaten well when dry; steeped in a strong solution of saltpetre; and lastly dried in an oven. If the solution of nitre be too strong, the agaric is loaded with this salt, which retards its inflammation.

“ Might not these inconveniences be avoided, by arming the piston rod with caoutchouc, and covering this with leather? If this process succeeded, it might be applied with advantage to all sorts of pumps.

“ II. To attain, if possible, a knowledge of the principle of inflammation in the pneumatic tinderbox, four things are to be considered —the materials of the tube, the matter contained in the tube, the materials of the piston, and the friction. Among the materials of the piston I include the grease, with which it is coated, to make it move more easily, and render it fitter to intercept the passage of the air.

“ In examining the question whether the spunk be kindled by electricity, I consider

“ 1st, That no part of the instrument is insulated; and that insulation is a necessary condition for producing sensible electricity with any of the machines we know. I say machines that we know, because the animal electricity, that manifests itself without insulation, is an exception to our mechanical means, and cannot here be taken into consideration.

“ 2dly, The friction of the piston, which is a greasy body, against a metallic substance, is not calculated to produce electricity.

“ 3dly, Experience demonstrates, that, unless during storms, the atmosphere seldom exhibits any signs of electricity at the height in which we breathe it; and that we must search for them with instruments in a more elevated region, or when electric clouds are passing over our heads. How then shall we estimate the infinitely small quantity of electric matter in a cubic inch of air, or even less, which the instrument contains?

“ 4thly, It is not without great difficulty, that we can kindle spunk with strong electric sparks. I have discharged a large jar on spunk strewed with powdered resin, and it has remained unkindled, though the resin caught fire, and burned entirely away.

“ As long as the instrument was made with metallic substances only, we were obliged to confine ourselves to the exterior marks of inflammation alone, without being able to assign the true cause, or at least furnish proofs of it. For to guess is not sufficient in natural philosophy; we must demonstrate, in order to give to facts that degree of certainty, which befits science; and this we cannot do here, without seeing what passes at the very point of inflammation.

“ The means are very simple. Nothing is necessary, but to substitute a glass for a metal tube. Those found in the shops being too slight, I applied to Mr. Laurent, the inventor of glass flutes, requesting him to procure me tubes of a similar quality. This artist, as much distinguished by his civility as by his talents, furnished me with three, which I fitted up. The first, eight inches long by eight lines in diameter, did not kindle the spunk. The second, nine inches long by six lines and three quarters in diameter, kindled it completely. This being destroyed by accident, I tried the third, eight inches long by seven lines in diameter, which succeeded equally well.

“ When the instrument is made to act, and the spunk kindles, we see a bright flash, that fills the capacity of the tube; and this light is so much the more vivid, in proportion as the compression is more rapid. If the compression be less powerful, the spunk does not kindle, but we perceive in the upper part of the tube a light vapour, that falls in undulations on the piston. When this has disappeared, if we draw back the piston, the vapour will reappear, as long as there is any air in the tube. These effects may be produced several times in succession, merely by pushing the piston with the hand. This vapour is so thin and diaphanous, that it is not perceptible in a strong light. It requires a sort of twilight to see it well.

“ But whence arises this vapour, and what is its nature? Assuredly it is not furnished by the materials of the instrument; it can only proceed, therefore, from what it contains, from the atmospheric air. Now, according to the present state of our knowledge, the air contains only nitrogen, oxygen, and a very small portion of carbonic acid; all gassiform substances, which are kept in this state by the great quantity of caloric that penetrates them, and are consequently heavier than it. But in compressing the air contained in the tube, what is the substance that must first give way? Is it not that which is lightest, the caloric, that general solvent, that principle of fluidity and volatilization, which gives wings even to metals to raise themselves in the air? Is then the vapour in question caloric, rendered visible by the approximation of its particles, which are compressed by the surrounding air, as air becomes visible in passing through liquids? This idea, which I am far from presenting as a thing proved, acquires more probability from the following experiments.

“ I substituted hydrogen for common air, and the vapour showed itself as before; but the spunk did not take fire. With carbonic acid gass, and with nitrogen, the effects were the same. The latter, which contained a little nitrous gass, gave a somewhat denser vapour. Oxygen, lightly compressed, yielded a vapour more rare and transient than that from common air. It had scarcely fallen on the piston when it rebounded and disappeared. When I compressed oxygen with a proper force for producing inflammation, the spunk, which commonly takes fire only at the anterior part, was almost entirely burned: yet for this experiment I used a copper instrument, the piston of which lost air so much, that it would no longer kindle spunk (with common air).

“ Perhaps it will be said, that the vapour came from the greasy matter on the piston, which adheres to the sides of the tube; and that it is expanded by the heat produced by the friction. To this I answer, in this case, 1st. The vapour should not show itself before the greasy matter is deposited on the sides of the tube; yet it appears at the first stroke of the piston, before the tube becomes greasy. 2dly. It should show itself below the piston, in the part which the piston has left; but, on the contrary, it always shows itself above. 3dly. There is no vapour, when the piston loses much air, if the friction be ever so rapid. 4thly. The vapour should be more apparent, when the piston exerts its friction throughout the whole length of the tube, than when it is confined to a small part of its upper extremity; yet the reverse frequently happens. 5thly. When the air is entirely decomposed no more vapour appears, but it shows itself again, if ever so little fresh air be introduced.

"As it was essential to ascertain whether the vapour did not contain an acid principle, I fastened to the surface of the piston, with a little green wax, a piece of muslin dipped in infusion of litmus, and afterward dried. After twenty strokes of the piston the colour was not changed. I put on a second piece of muslin larger than the first, and the edges of which were loose. This was burned all round, without the colour of the rest being altered. Lastly, a third piece, which was wet, experienced no change of colour.

"From these experiments it follows, that no acid principle is developed: that all aeriform substances, as well as common air, produce a light vapour: that no other gass, except oxygen and common air, kindles the spunk: that oxygen produces a much more powerful combustion than common air, consequently oxygen acts an important part in the inflammation: that as it can exert its action only when set free by the decomposition of the common air, of which it constitutes a fourth part, it follows, that the air contained in the tube is decomposed by the simple force of compression: that the vapour produced is not owing to the oxygen, since it shows itself equally in gasses that contain no oxygen: that this vapour is the effect of some agent common to all gasses: and that we may presume it is caloric itself, rendered visible by the sudden approximation of its parts in a small space, where it rises to a temperature that is increased in the oxygen so as to kindle the spunk.

"It sometimes happens, that the spunk is turned black without kindling. In this case, as well as when it is kindled, if we draw back the piston in the tube, a dense vapour, that may be smelt, issues out, which is not of the same nature as the former. That shows itself before the inflammation: this always succeeds it. That is the principle of the inflammation: this a product furnished by the combustion of the spunk, of which it has the smell.

TO'UCHY. *a.* (from *touch.*) Peevish; irritable; irascible; apt to take fire. A low word (*Arbuthnot*).

TOUGH. *a.* (ꞇoh, Saxon.) 1. Yielding to flexure or extension without fracture; not brittle (*Bacon*). 2. Stiff; not easily flexible (*Dryden*). 3. Not easily injured or broken (*Shakspeare*). 4. Viscous; clammy; ropy; tenacious.

To TO'UGHEN. *v. n.* (from *tough.*) To grow tough (*Mortimer*).

To TO'UGHEN. *v. a.* To make tough.

TO'UGHNESS. *s.* (from *tough.*) 1. Not brittleness; flexibility (*Dryden*). 2. Viscosity; tenacity; clamminess; glutinousness (*Arbuthnot*). 3. Firmness against injury (*Shakspeare*).

TOUL, a fortified town of France, in the department of Meurte, and lately a bishop's see. The cathedral and late episcopal palace are handsome structures. It is seated on the Moselle, in a plain, almost surrounded by mountains, 13 miles W. by S. of Nancy, and 34 W.S.W. of Metz.

TOULON, a fortified city and seaport of France, capital of the department of Var, and lately an episcopal see. It is divided into the old and new quarter: the first, which is ill built, has nothing remarkable in it but the Rue aux Arbres (a kind of mall) and the townhouse; the other contains the magnificent works constructed by Lewis XIV. many fine houses, and a grand oblong square, lined with trees, and serving as a parade. The old and new harbours communicate with each other by means of a canal. The old haven has a noble quay, on which is the townhouse, and it is protected by two moles, begun by Henry IV. The new haven was constructed by Lewis XIV. as were the fortifications: it contains an arsenal, a ropewalk, a park of artillery, dock-yards, basins, and every thing to be expected in the second port for men of war in this country. The galleys, transferred from Marseilles some years ago, occupy a basin in the new port. Many of the galley-slaves are artisans, and some merchants: they no longer sleep on board the galleys, but are provided with accommodations on shore, in a vast building, newly erected for that purpose. Both the old and new port have an outlet into the outer road or harbour, which is 10 miles in circuit, surrounded by hills, and the entrance defended, on both sides, by a fort and batteries. Toulon is the only mart in the Mediterranean for the re-exportation of the products of the East Indies. In 1706 it was bombarded by the allies, both by land and sea, by which almost the whole town was reduced to a heap of ruins, and several ships burned; but they were at last obliged to raise the siege. In 1721 it experienced the dreadful ravages of a pestilence. In 1793 it capitulated, in the name of Lewis XVII. to the British, who, not finding the place tenable, evacuated it the same year, after having destroyed the arsenal, &c. Toulon is seated on a bay of the Mediterranean, 37 miles S.E. of Marseilles, and 517 S.S.E. of Paris. Lon. 5. 55 E. Lat. 43. 7 N.

TOULOUSE, a city of France, in the department of Upper Garonne, with an archbishop's see. It contains 60,000 inhabitants, and is the most considerable city in France, next to Paris and Lyons, although its population bears no proportion to its extent. It was the capital of the Tectosages, who made so many conquests in Asia and Greece. It was next a Roman colony, and was successively the capital of the Visigoths (who destroyed the superb amphitheatre, of which there are still some remains, the capitol, and other Roman monuments) and that of Aquitaine. The walls of the city, as well as the houses, are built with bricks. St. Stephen's, the metropolitan church, would be incomparable, if the nave were equal to the choir; and the archbishop's palace is magnificent. The town-house, a modern structure, forms a perfect square, 324 feet long, and 66 high: the principal front occupies an entire side of the grand square, lately called the Place Royale. In the great hall, called the Hall of illustrious Men, is the statue of the chevalier Isaure, and the busts of all the great men to whom Toulouse has given birth. Communicating with the Atlantic, on one side, by the river Garonne, and with the Mediterranean, on the other, by the canal of Languedoc, Toulouse might have been a very commercial city; but the taste of the inhabitants has been principally for the sciences and belles-lettres. The little commerce they have consists in leather, drapery, blankets, mignionets, oil, iron, mercery, hardware, and books. The bridge over the Garonne is at least equal to those of Tours and Orleans: it forms the communication between the city and suburb of St. Cyprian. Toulouse is 37 miles E. of Auch, 125 S.E. of Bourdeaux, and 350 S. by W. of Paris. Lon. 1. 21 E. Lat. 43. 35 N.

TOUP (Jonathan), a critic, born at St. Ives, in Cornwall, 1713. He was educated in the school of his native town, and at St. Merryn's and Exeter college, Oxford. His master's degree was taken at Cambridge, 1756. His emendationes in Suidam, in 1760, continued in another volume 1764, recommended him to the notice of Warburton, by whose means bishop Keppel bestowed on him a prebend in Exeter cathedral, and the vicarage of St. Martyn's. He published his appendiculum not. in Suidam, 1775, and in 1778 his edition of Longinus in 4to. and afterwards in 8vo. He died 1785, aged 72.

TOUPET. *s.* (French.) A curl; an artificial lock of hair (*Swift*).

TOUR. *s.* (*tour*, French.) 1. Ramble; roving journey (*Arbuthnot*). 2. Turn; revolution (*Blackmore*).

TOURAINE, a late province of France, bounded on the north by Maine, on the east by Orleanois, on the south by Berris, and on the west by Anjou and Poitou. It is about 58 miles in length, and 55 in breadth where it is broadest. This country is watered by 17 rivers, besides many brooks, which not only render it delightful, but keep up a communication with the neighbouring provinces. The air is temperate, and the soil is so fruitful that it is called the garden of France. It now forms the department of Indre and Loire, of which Tours is the capital.

TOURMALINE, in mineralogy. See SCORLUS.

TOURNAMENT, or TURNAMENT, a martial sport or exercise, which the ancient cavaliers used to perform, to shew their bravery and address.

The first tournaments were only courses on horseback, wherein the cavaliers tilted at each other with canes in manner of lances; and were distinguished from justs, which were courses or careers, accompanied with attacks and combats, with blunted lances and swords.

Others say, it was a tournament when there was only one quadril or troop; and that where there were several to encounter each other, it was a just. But it is certain the two became confounded together in process of time; at least we find them so in authors.

The prince who published the tournament used to send a king at arms with a safe-conduct, and a sword, to all the princes, knights, &c. signifying, that he intended a tournament and a clashing of swords, in the presence of ladies and damsels; which was the usual formula of invitation.

The first engaged man against man, then troop against troop; and after the combat, the judges allotted the prize to the best cavalier, and the best striker of swords; who was, accordingly, conducted in pomp to the lady of the tournament; where, after thanking her very reverently, he saluted her and likewise her two attendants.

These tournaments made the principal diversion of the thirteenth and fourteenth centuries. Munster says, it was Henry the Fowler, duke of Saxony, and afterwards emperor, who died in 936, that first introduced them; but it appears from the chronicle of Tours, that the true inventor of this famous sport, at least in France, was one Geoffry, lord of Preuilli, about the year 1066.

It is difficult to fix the epocha of their institution, as many nations have laid claim to it. Nithard relates, that at the interview of Charles the Bald, king of France, who succeeded to the throne in the year 840, and his brother Lewis of Germany, at Strasburg, the gentlemen of the retinue of both princes fought on horseback, to display their courage and skill.

Du-Cange says that these sports were so peculiar to the French, that they were called conflictus Gallici, or French combats. To this purpose Matthew Paris, under the year 1179, says, "Henricus rex Anglorum junior mare transiens in conflictibus Gallicis, et profusioribus expensis, triennium peregit, regiaque majestate deposita, totus est de rege translatus in militem."

The Historia Byzantina tells us, that the Greeks and Latins borrowed the use thereof from the Franks; and we find mention made of them in Cantacuzenus, Gregorias, Bessarion, and others of the late Greek authors.

Instances of them occur among the English in the reign of king Stephen, about the year 1140; but they were not much in use till Richard's time, towards the year 1149. After which period these diversions were performed with extraordinary magnificence in the Tilt-yard near St. James's, Smithfield, and other places. At last, however, they were found to be productive of bad effects, and the occasions of several fatal misfortunes, as in the instance of Henry II. of France, and of the tilt exhibited at Chalons, which, from the numbers killed on both sides, was called the little war of Chalons. These and other inconveniences, resulting from these dangerous pastimes, gave the popes occasion to forbid them, and the princes of Europe gradually concurred in discouraging and suppressing them.

Budæus derives the word tournament from *Trojana agmina*; others from *Trajamentum, quasi ludus Trojæ.* Menage deduces it from the Latin *tornensis*, or the French *tourner*, because the combatants rode in rings and circles, and were obliged to make many turnings with their horses, as the laws of the game required.

TOURNAN, or TOURNANS, a town of France, in the department of Seine and Marne, 22 miles E. by S. of Paris. Lon. 2. 45 E. Lat. 48. 43 N.

TOURNAY, a considerable city of Austrian Flanders, capital of the Tournaysis, with a bishop's see, and a strong castle. It has several fine manufactures, and is particularly famous for good stockings. The cathedral, and the abbey of St. Martin, are very magnificent. It was taken by the allies in 1709, and ceded to the house of Austria by the treaty of Utrecht; but the Dutch were allowed to place a garrison in it, as one of the barrier towns. It was taken in 1745, by the French, who demolished the fortifications, but restored it in 1748. In 1781, the emperor Joseph obliged the Dutch to withdraw their garrison. It was again taken by the French in 1792: they were obliged to abandon it, in 1793, but re-entered it again, on the final conquest of Austrian Flanders, in 1794. It is seated on the Scheld, which divides it into two parts, that are united by a bridge, 14 miles S.E. of Lisle, 30 S.W. of Ghent, and 135 N. by E. of Paris. Lon. 3. 28 E. Lat. 50. 33 N.

TOURNEFORT (Joseph Pitton de), a botanist, born at Aix in Provence, 1656. Though devoted to theological pursuits by his father, he did not abandon botanical studies, and when his own master, he applied himself to philosophy and medicine. In 1678 he explored the mountains of Dauphiné and Savoy in quest of plants, and in 1679 perfected himself in medicine at Montpellier. In 1681 he visited the mountains of Catalonia, and the Pyrenees, and in 1683 he was appointed botanical professor. He afterwards travelled over Spain, Portugal, Holland, and England, and in 1700 was sent by the king to examine the plants of Greece, Asia, and Africa, and to make observations on the manners and the natural history of those countries. He returned after three years, and brought with him 1356 species of plants. He was soon after professor of physic in the college royal. He received an injury from the wheel of a cart which passed by him, and neglecting the proper remedies, he was seized with a spitting of blood, which carried him off, 1708. He published elements of botany, 3 vols. 8vo. enlarged to 3 vols. 4to.—history of plants near Paris, 12mo. enlarged to 2 vols.—voyage to the Levant, 2 vols. 4to. and three in 8vo.—a treatise on the materia medica, 2 vols. 12mo. &c.

TOURNEFORTIA, in botany, a genus of the class pentandria, order monogynia. Berry two-celled, two-seeded, superior, perforated with two pores at the tip. Eleven species; natives of the West Indies or South America. The following are cultivated.

1. T. hirsutissima. Hairy tournefortia.
2. T. volabilis. Climbing tournefortia.
3. T. fætidissima. Fetid tournefortia.
4. T. humilis. Dwarf tournefortia.
5. T. argentea. Silvery tournefortia.
6. T. cymosa. Broad-leaved tournefortia.
7. T. suffruticosa. Hoary-leaved tournefortia.

These are all stove plants, and are to be propagated by seeds obtained from their natural soils.

TOURNIQUET, in surgery, an instrument formed with screws, for compressing any part with rollers, &c. for the stopping of hæmorrhages. See SURGERY.

TOURNON, a town of France, in the department of Ardeche, with a fine college and a castle. It is seated on the declivity of a mountain, near the river Rhone, 40 miles W. of Grenoble, and 280 S. by E. of Paris. Lon. 4. 50 E. Lat. 45. 6 N.

TOURNUS, a town of France, in the department of Saone and Loire, seated on the Saone, in a country fertile in corn and wine, 15 miles S. of Chalons, and 202 S. by W. of Paris. Lon. 5. 0 E. Lat. 46. 34 N.

TOURRETTE (Mark Anth. Lew. Claret de la), of Lyons, studied in the jesuits' college, and became one of the magistrates of his native city. He formed a valuable collection of insects and of herbs, and cultivated in his garden not less than 3000 of the rarest plants. He was attacked by an inflammation in his lungs at the siege of his native town in the autumn of 1793, and he survived it but a few days. He died aged 64. He published demonstrations elementaires de botanique, 2 vols. 8vo.—voyage au mont Pila, 8vo. &c.

TOURETTIA, in botany, a genus of the class didynamia, order angiospermia. Calyx two-lipped; corol without any upper lip, in the place of which are two small teeth; capsule prickly, four-celled, two-valved. One species only, an annual of Peru, with a fistulous, climbing stem; opposite leaves; and flowers in a naked terminal raceme.

TOURS, a considerable city of France, capital of the department of Indre and Loire. From an archiepiscopal see it has been lately, reduced to a bishopric suffragan to that of Bourges. It is seated on the Loire, and near the Cher. Over the former is one of the finest bridges in Europe, consisting of fifteen elliptic arches, each seventy-five feet diameter: three of these were carried away by the breaking up of ice in 1789. The principal church is remarkable for the delicacy of its structure, its curious clock, its mosaic pavement, and its rich library of manuscripts. Under the ministry of cardinal Richelieu, 27,000 persons were here employed in the silk manufacture; and now the whole number of inhabitants is only 33,000. The red wines of Tours are much esteemed. In one of the suburbs is the late abbey of Marmoutier, reputed the most ancient in the West. Near the city is Plessis-les-Tours, a late royal palace, built by the profligate and superstitious Lewis XI. who died here, in 1483, notwithstanding he had the precaution to be covered all over with relics. Tours is 52 miles N.N.E. of Poitiers, 54 E. of Angers, and 127 S.W. of Paris. Lon. 0. 47 E. Lat. 47. 24 N.

To TOUSE. *v. n.* (perhaps of the same original with *taw, tease, tose.*) To pull; to tear; to haul; to drag: whence *touser*, or *towzer*, the name of a mastiff (*Drayton*).

TOW. *s.* (ꞇop, Sax.) Flax or hemp beaten and combed into a filamentous substance (*Sharp*).

To Tow. *v. a.* (ꞇeop, ꞇeohan, Saxon; *toghon*, old Dutch.) To draw by a rope, particularly through the water (*Shaksp.*).

TO'WARD. To'wards. *preposition.* (ꞇopaꞃꝺ, Saxon.) 1. In a direction to: *he set his face* toward *the wilderness* (*Numbers*). 2. With local tendency to: *the currents drive* towards *the sea* (*Milton*). 3. Near to: as, *the danger now comes* toward *him*. 4. With respect to; touching, regarding: *he has love* towards *us* (*Sidney*). 5. With ideal tendency to: *this was the first act* toward *a breach* (*Clarendon*). 6. Nearly; little less than: *he is* toward *seventy* (*Swift*).

To'ward. To'wards. *ad.* Near; at hand; in a state of preparation (*Shakspeare*).

To'ward. *a.* Ready to do or learn; not froward.

TO'WARDLINESS. *s.* (from *towardly.*) Docility; compliance; readiness to do or to learn (*Raleigh*).

TO'WARDLY. *a.* (from *toward.*) Ready to do or learn; docile; compliant with duty (*Bacon*).

TO'WARDNESS. *s.* (from *toward.*) Docility (*South*).

TOWCESTER, a town in Northamptonshire, with a market on Tuesday, and manufactures of lace and silk. It was once strongly fortified, and the Roman Watling-street passes through the town. It is seated on the Weedon, nine miles S.S.W. of Northampton, and 60 N.W. of London.

TO'WEL. *s.* (*touaille*, Fr. *touaglio*, Ital.) A cloth on which the hands are wiped (*Dryden*).

TO'WER. *s.* (ꞇoꞃ, Saxon; *tour*, French.) 1. A high building; a building raised above the main edifice (*Genesis*). 2. A fortress; a citadel (*Psalms*). 3. A high headdress (*Hudibras*). 4. A high flight; elevation.

To To'wer. *v. n.* To soar; to fly or rise high (*Dryden*).

TO'WERED. *a.* (from *tower.*) Adorned or defended by towers (*Milton*).

TOWERS (Joseph), an historian and biographer, was born at Sherborne, in 1737, and brought up to the printing business under Goadby of Sherborne. He afterwards settled as a bookseller in London, but having a turn for study, he forsook trade, and engaged in the ministry among the dissenters of the independent persuasion. In 1774 he was ordained pastor of a congregation at Highgate; and in 1778 was chosen one of the ministers of Newington-green meeting, in conjunction with Dr. Price. In 1779 he received his degree of L.L. D. from Edinburgh. He died May 30, 1799. Dr. Towers wrote the first seven volumes of the British Biography; a Life of Frederic III. king of Prussia; Observations on Hume's History of England; some sermons, and political tracts, and had a share in the Biographia Britannica, with Dr. Kippis.

TO'WERY. *a.* (from *tower.*) Adorned or guarded with towers (*Pope*).

TOWN. *s.* (ꞇun, Saxon; *tuyn*, Dutch.) 1. Any walled collection of houses (*Joshua*). 2. Any collection of houses larger than a village (*Shakspeare*). 3. In England any number of houses to which belong a regular market, and which is not a city or the see of a bishop. 4. The inhabitants of a town (*Chapman*). 5. The court end of London (*Pope*). 6. The people who live in the capital (*Pope*).

TO'WNCLERK. *s.* (*town* and *clerk.*) An officer who manages the public business of a place (*Acts*).

TOWNHO'USE. *s.* (*town* and *house.*) The hall where public business is transacted (*Add.*).

TO'WNSHIP. *s.* (*town* and *ship.*) The corporation or district of a town (*Raleigh*).

TO'WNSMAN. *s.* (*town* and *man.*) 1. An inhabitant of a place (*Clarendon*). 2. One of the same town.

TO'WNTALK. *s.* (*town* and *talk.*) Common prattle of a place (*L'Estrange*).

TOWTON, a village in W. Yorkshire, three miles S.E. of Tadcaster. It is famous for that bloody battle between the forces of the houses of York and Lancaster, so fatal to the latter, on Palm-Sunday, 1461.

TOWY, a river of Wales, which rises in Cardiganshire, enters Carmarthenshire at its N.E. extremity, and flows by Llanymddoory, Llandilovawr, and Carmarthen, into the Bristol channel.

TO'XICAL. *a.* (*toxicum*, Latin.) Poisonous; containing poison.

TOXICARIA MACASARIENSIS. An Indian poison, obtained from a tree hitherto undescribed by any medical botanist, known by the name of boas-upas; it is a native of South America. Concerning this plant various and almost incredible particulars have been related, both in ancient and modern times; some of them true, others probably founded on superstition. Rumphius testifies that he had not met with any other more dreadful, produced from any vegetable. And he adds, that this poison, of which the Indians boasts was much more terrible to the Dutch than any warlike instrument. He likewise says, it is his opinion, that it is of the same natural order, if not of the same genus, as the cestrum.

The Dutch inhabitants of India call it giftboom, or spatenboom. By Rumphius it is called arbor toxicaria, and among the Malay inhabitants of Malacca, Java, and Sumatra, it has the names of ipo, cajo-upas, boa-upas, and lupo matta ju. There are two species of it mentioned by Rumphius, a male and female; but the flowers and the fruit are unknown. The tree is represented as having a thick trunk, spreading branches, ash-coloured bark; the wood is solid, of a yellowish white colour, variegated with black spots.

This tree grows in several of the warmer parts of India, principally in the islands of Java, Sumatra, Borneo, Bali, Macasser, and Celebes. It is found for the most part in very desert places, and on bare mountains. It is easily distinguished at a distance, as no other tree will grow near it; the ground on which it stands is barren and parched up.

The juice of this tree, in which the whole deleterious power resides, is of a dark brown colour, and, being dried, appears like a resin. That obtained from the male tree is said to be the hardest and best, resembling pitch; being friable by the fire.

Those who collect this juice must be extremely cautious, that they may not be endangered. They should be covered with linen, that they may not be incommoded by the vapours which it emits. Long bamboos are therefore employed, pointed like a spear at the extremity, as no one dare remove the juice with their hands. These canes are pushed obliquely into the bark of the trunk, that the juice may gradually drop into the hollow of the cane, where it condenses into a substance, and of the colour as above mentioned. The nearer the root that the juice is obtained, the more efficacious the poison. Upwards of twenty reeds are left in the tree for three or four days, that the juice may collect and harden in their cavities. The upper joint of the reed being thus filled, is cut off from the remaining part. This juice, while yet recent, is formed into small globules, put into the hollow cavities of reeds, and then kept in a dry place, covered with seven or eight folds of linen, but it must every week be taken out and cleaned, lest it should become mouldy. By exhalation it loses its activity, which is much diminished in the space of one year; and in a few years is entirely gone.

The poisonous quality of this tree is very dreadful. From the mere halitus which it emits, the limbs are as it were congealed, and at the same time affected with spasms. If any one stand under it with his head bare, a loss of hair is the consequence; and if a drop from the tree falls on any part, an excessive swelling arises. Even the air about this tree is so infected, that birds, when sitting on its branches, in a short time fall down dead; they can even with difficulty fly over it; and the ground is barren for near a stone cast around it.

The poison of the female tree, however, is said to be much weaker, and from that reason it is employed in catching wild beasts. It is not used for poisoning weapons, unless mixed with the stronger kind; but by this the power of both is supposed to be increased. When any person is wounded with a dart, upon which this poison has been rubbed, it very quickly diffuses itself through every part, exciting a violent sense of heat and vertigo, to which death soon succeeds. The poisoned weapons in general preserve their power for two years; but in some instances only two or three months. It is for the most part fatal, from immediate admission into the blood; and accordingly Rumphius asserts, that the inhabitants of Celebes sometimes venture to employ it as a remedy internally.

The strength of this poison is determined as follows. A quantity of the expressed juice of the root of the lamprijang or amomum zerumbet, having a portion of water mixed with it, is strained through linen, and to this a small portion of the poison is added. Upon this mixture a sudden ebullition takes place, by which the strength of the poison is determined, according to the violence of the boiling. This operation is said not to be dangerous, as the operation feels only a sudden increase of heat.

The deleterious poison in general proves fatal in the space of half an hour, sometimes in a quarter of an hour; so that antidotes can be very rarely employed. The Macasserian kings, with the view of exploring the deleterious power of the poison, have directed experiments to be performed on criminals. But even when a finger or thumb be wounded and amputated, it cannot be saved.

It is not entirely of a gummy nature, as it may be dissolved in arrack. The Indians employ this poison to punish criminals, and likewise to rub on the weapons they use. But nevertheless in its crude state it is employed as an antidote against other poisons, both internally and externally. It is chiefly used in the form of plaster, against the bite of poisonous insects. It is said to allay pain quickly, and extract the poison sooner than any other remedy. A pill formed by the mixing it with the pulp of some fruits, is successfully employed in cases of obstinate ulcers, and cutaneous eruptions. When weakened, it is used in killing deer, and the flesh thus killed is by no means obnoxious.

TOXICODENDRON, or TOXICODENDRUM, in botany. See RHUS.

TOXICOLOGY. (τοξικολογια, from τοξον, an arrow or bow; because the darts of the ancients were usually besmeared with some poisonous substance; and λογος, a discourse.) A dissertation on poisons. See POISON.

TOY. *s.* (*teyen*, *tooghen*, Dutch.) 1. A petty commodity; a trifle; a thing of no value (*Abbot*). 2. A plaything; a bauble (*Add.*). 3. Matter of no importance (*Shakspeare*). 4. Folly; trifling practice (*Hooker*). 5. Play; sport; amorous dalliance (*Milton*). 6. Odd story; silly tale (*Shakspeare*). 7. Slight representation (*Hooker*). 8. Wild fancy; odd conceit (*Shakspeare*).

To Toy. *v. n.* (from the noun.) To trifle; to dally amorously; to play.

TOYISH. *a.* (from *toy*.) Trifling; wanton.

TO'YISHNESS. *s.* (from *toyish*.) Nugacity; wantonness (*Glanville*).

TO'YMAN. *s.* A seller of toys (*Young*).

TO'YSHOP. *s.* A shop where playthings and little nice manufactures are sold (*Pope*).

To TOZE. *v. a.* (See Touse and Tease.) To pull by violence or importunity (*Shaksp.*).

TOZZETTI (John Targioni), an Italian botanist, was born at Florence, in 1712. He applied himself to the study of medicine in the university of Pisa, where he obtained the doctoral prize in 1734, and succeeded Micheli the botanist as keeper of the garden of the botanical society at Florence. He wrote several works in Latin, and some in Italian. His first was a Thesis upon the utility of Plants, in the practice of Physic; the others were chiefly connected with his profession. He died at Florence, in 1783.

TOZZIA, in botany, a genus of the class didynamia, order angiospermia. Calyx five-toothed; capsule one-celled, globular, one-seeded. One species; a native of the Alps.

TRA LOS MONTES, a province of Portugal, beyond the mountains, with regard to the other provinces of this kingdom, whence it has its name. It is bounded on the N. by Galicia, W. by Entre Douro e Minho, S.W. and S. by Beira, and E. by Leon. It is fertile in wine and oil, and abounds in cattle. The Douro divides it into two parts, and Miranda is the capital.

TRABECULÆ. (*trabecula*, a small beam.) This word is mostly applied by anatomists to the small medullary fibres of the brain, which constitute the commissures.

TRACE. *s.* (*trace*, Fr. *traccia*, Ital.) 1. Mark left by any thing passing; footsteps (*Milton*). 2. Remain; appearance of what has been (*Temple*). 3. (from *tirasser*, Fr. *tirasses*, traces.) Harness for beasts of draught (*Pope*).

To Trace. *v. a.* (*tracer*, Fr. *tracciare*, Ital.) 1. To follow by the footsteps, or remaining marks (*Temple*). 2. To follow with exactness (*Denham*). 3. To mark out (*Swift*). 4. To walk over (*Shakspeare*).

TRA'CER. *s.* One that traces (*Howel*).

TRACES (Ladies), in botany. See Ophrys.

TRACHEA. (τραχεια; so called from its roughness; from τραχυς, rough.) The windpipe. The trachea is a cartilaginous and membranous canal, through which the air passes into the lungs. Its upper part, which is called the larynx, is composed of five cartilages. The uppermost and smallest of these cartilages is placed over the glottis or mouth of the larynx, and is called epiglottis, as closing the passage to the lungs in the act of swallowing. The sides of the larynx are composed of the two arytenoid cartilages, which are of a very complex figure, not easy to be described. The anterior and larger part of the larynx is made up of two cartilages, one of which is called thyroides or scutiformis, from its being shaped like a buckler; and the other crycoides or annularis, from its resembling a ring. Both these cartilages may be felt immediately under the skin, at the fore part of the thorax; and the thyroides, by its convexity, forms an eminence called the pomum adami, which is usually more considerable in the male than in the female subject.

All these cartilages are united to each other by means of very elastic ligamentous fibres; and are enabled by the assistance of their several muscles, to dilate or contract the passage of the larynx, and to perform that variety of motion which seems to point out the larynx as the principal organ of the voice; for when the air passes out through a wound in the trachea, it produces no sound.

These cartilages are moistened by a mucus, which seems to be secreted by minute glands situated near them. The upper part of the trachea, and the cricoid and thyroid cartilages, are in some measure covered anteriorly by a considerable body, which is supposed to be of a glandular structure, and from its situation is called the thyroid gland, though its excretory duct has not yet been discovered, or its real use ascertained. The glottis is entirely covered by a very fine membrane, which is moistened by a constant supply of a watery fluid. From the larynx the canal begins to take the name of trachea or aspera arteria, and extends from thence as far down as the fourth or fifth vertebræ of the back, where it divides into two branches, which are the right and left bronchial tube. Each of these bronchia ramifies through the substance of that lobe of the lungs, to which it is distributed, by an infinite number of branches, which are formed of cartilages separated from each other like those of the trachea, by an intervening membraneous and ligamentary substance. Each of these cartilages is of an angular figure; and as they become gradually less and less in their diameter, the lower ones are in some measure received into those above them, when the lungs after being inflated, gradually collapse by the air being pushed out from them in expiration. As the branches of the bronchiæ become more minute, their cartilages become more and more angular and membraneous, till at length they become perfectly membraneous, and at last become invisible. The trachea is furnished with fleshy or muscular fibres, some of which pass through its whole extent longitudinally, while the others are carried round it in a circular direction, so that by the contraction or relaxation of these fibres, it is enabled to shorten or lengthen itself, and likewise to dilate or contract the diameter of its passage. The trachea and its branches, in all their ramifications, are furnished with a great number of small glands which are lodged in their cellular substance, and discharge a mucous fluid on the inner surface of these tubes.

The cartilages of the trachea, by keeping it constantly open, afford a free passage to the air which we are obliged to be incessantly respiring; and its membraneous part, by being capable of contraction or dilatation, enables us to receive and expel the air in a greater or less quantity, and with more or less velocity, as may be required in singing and declamation. This membraneous structure of the trachea posteriorly, seems likewise to assist in the descent of the food, by preventing that impediment to its passage down the œsophagus, which might be expected, if the cartilages be complete rings. The trachea receives its arteries from the carotid and subclavian arteries, and its veins pass into the jugulars. Its nerves arise from the recurrent branch of the eighth pair, and from the cervical plexus.

TRACHEÆ, in botany. Air-vessels. Vasa aërem attrahentia. Philos. Bot. Canales spirales aëri recipiendo et distribuendo nati. Regn. Veg. Spiral channels in vegetables for receiving and distributing air. See **Botany** and **Physiology**.

TRACHELIUM. Throat-wort. In botany, a genus of the class pentandria, order monogynia. Corol funnel-form; stigma globular; capsule three-celled, inferior. Three species: two natives of the Cape; one of Italy and the East. This last, T. cæruleum, blue throat-wort, is cultivated as an ornament for rock-works and other situations where the earth is poor. It is a biennial, and in some varieties a perennial plant, with a tuberous root, its stalks rising a foot and a half high; flowers small, azure blue, appearing in June and July. It may be easily raised from seeds sown in the autumn in a bed or border of light mould.

TRACHELO. (from τραχηλος, the neck.) Names in anatomy compounded of this word belong to muscles which are attached to the neck; as the

Trachelo-mastoideus. (*musculus trachelo mastoideus.*) A muscle situated on the neck, which assists the complexus, but pulls the head more to one side.

TRACHENBURG, a town of Silesia, capital of a principality of the same name, abounding in corn, cattle, and timber. It has a fine castle, and is seated on the Bartch, 26 miles N.N.W. of Breslau. Lon. 16. 56 E. Lat. 51. 27 N.

TRACHEOTOMY. (*tracheotomia*, τραχεοτομια, from τραχυς, rough, and τεμνω, to cut) A synonym of bronchotomy. See **Bronchotomy**.

TRACHICHTHYS, in zoology, a genus of the class pisces, order thoracica. Head rounded in front; eyes large; mouth wide, toothless, descending; gill-membrane with eight rays, the four lowermost of which are rough on the edges; scales rough; abdomen cataphracted with large carinate scales. One species only, trachichthys Australis. Inhabits New Holland; about five inches long, and two deep; the body coated with scales so strongly and closely inserted, that it is not possible to detach one from the rest without bringing with it a portion of the skin.

Eyes extremely large, irids silvery; gill-covers armed on the upper part with a strong rough spine, and a small one on the lower; scales fringed, and covered with small spines, those of the abdomen projecting into a shortish spine, pointing backwards and forming a sharp keel; tail strongly forked; edges of all the fins paler; first three rays of all the fins, except the pectoral, strong, rough, and finely serrate outwards.

TRACHINUS. Weever. In zoology, a genus of the class pisces, order jugularia. Head compressed, spinous at the top; gill-membrane six-rayed, the covers aculeated, lower lamina serrate; vent near the breast. One species only, trachinus draco, common weever, or sting-bull: a fish of a long and compressed figure, marked upon the sides by a number of cinereous lines, that arise from the middle of the back, and proceed towards the belly. The two lateral lines that extend from the gills to the tail are placed much nearer the back than those of any other fish. The bronchiæ are yellow, the belly white, and the whole body covered with small thin scales: eyes near the snout; irids yellow, punctuated with black spots: lower jaw beyond the upper; both armed with small teeth: apertures of the gills uncommonly large, and each of the covers furnished upon the upper angle with a strong sharp spine: dorsal fins two; the first of five sharp prickly rays; the second supported only by cartilaginous rays, and prolonged almost to the tail: pectoral fins situated lower than usual: ventral fins jugular, each strengthened by six rays: anus not far from the breast; from whence to the tail proceeds a long fin fortified by thirty-two rays, which project beyond the membrane that connects them.

This fish is found on our own coasts, and inhabits most European seas; seldom grows to twelve inches long; buries itself in the sand, and leaves only its nose out; if trodden on strikes with great force. The wounds inflicted by the spinous rays of the first dorsal fin produce an immediate and often dangerous inflammation, extending all up the arm and shoulder. Feeds on shell-fishes, crabs, aquatic insects, and smaller fishes; flesh very good.

TRACHOMA. (τραχωμα; from τραχυς, rough.) An asperity in the internal superficies of the eyelid. The effects are a violent ophthalmia, and a severe pain, as often as the eyelid moves. The species are, 1. Trachoma sabulosum, from sand falling between the eye and the eyelid of persons travelling, blown by a high wind; this happens chiefly in sabulous situations, and may be prevented by spectacles for the purpose, or by guarding against the flights of sand by covering the eyes. 2. Trachoma caranculosum, which arises from caruncles, or fleshy verucæ, growing in the internal superficies of the eyelid. This species of the trachoma is called morum palpebræ internæ, because the tuberculous internal superficies appears of a livid red like a mulberry. Others call these carunculæ pladorotes. 3. Trachoma herpeticum, which are hard pustules in the internal superficies of the eyelids. This is also called ſycosis, seu palpebra ficosa, from its resemblance to granulated substances in cut fig. With the Greeks it is nominated atomablepharon, or proptoris; by the Latins, prolapsus palpebræ superioris.

TRACK. *s.* (*trac*, old Fr. *traccia*, Ital.) 1. Mark left upon the way by the foot, or otherwise (*Milton*). 2. A road; a beaten path (*Dryden*).

To **TRACK.** *v. a.* (from the noun.) To follow by the footsteps or marks left by the way (*Dryden*).

TRA′CKLESS. *a.* (from *track*.) Untrodden; marked with no footsteps (*Prior*).

TRACT. *s.* (*tractus*, Latin.) 1. Any kind of extended substance (*Milton*). 2. A region; a quantity of land (*Raleigh*). 3. Continuity; any thing protracted, or drawn out to length (*Howel*). 4. Course; manner of process (*Sh.*). 5. It seems to be used by *Shakspeare* for *track*. 6. (*tractatus*, Lat.) A treatise; a small book (*Swift*).

TRA′CTABLE. *a.* (*tractabilis*, Lat. *traitable*, French.) 1. Manageable; docile; compliant; obsequious; practicable; governable (*Tillotson*). 2. Palpable; such as may be handled (*Holder*).

TRA′CTABLENESS. *s.* (from *tractable.*) The state of being tractable; compliance; obsequiousness (*Locke*).

TRA′CTABLY. *ad.* In a tractable manner; gently.

TRA′CTATE. *s.* (*tractatus*, Lat.) A treatise; a tract; a small book (*Brown*).

TRA′CTILE. *a.* (*tractus*, Latin.) Capable to be drawn out or extended in length; ductile (*Bacon*).

TRACTI′LITY. *s.* (from *tractile.*) The quality of being tractile (*Derham*).

TRA′CTION. *s.* (from *tractus*, Lat.) The act of drawing; the state of being drawn.

TRADE. *s.* (*tratta*, Italian.) 1. Traffic; commerce; exchange of goods for other goods, or for money (*Temple*). 2. Occupation; particular employment, whether manual or mercantile (*Arbuthnot*). 3. Instruments of any occupation (*Dryden*). 4. Any employment not manual; habitual exercise (*Bacon*). 5. Custom; habit; standing practice (*Shaksp.*).

To **TRADE.** *v. n.* (from the noun.) 1. To traffic; to deal; to hold commerce (*Arbuth.*). 2. To act merely for money (*Shakspeare*).

To **TRADE.** *v. a.* To sell or exchange in commerce (*Ezekiel*).

In this and many other countries of Europe, the notion has of late been gaining ground, that it is not a little derogatory to the character of a gentleman to engage in trade. This notion is too puerile and ridiculous to be worth a serious refutation. We may just remark that scarcely any nations, either ancient or modern, have been celebrated for their power, which have not also been celebrated for the extent of their commerce, or the ingenuity and industry of their tradesmen. Among the ancient Jews it was a point of conscience to teach their children some trade, even though they bred them up to the liberal sciences. Hence one of their rabbies is sirnamed the shoemaker, another the baker, &c. And the same custom still prevails in many eastern nations. Sir Paul Ricaut informs us that the grand signior, to whom he was ambassador, was taught to make wooden spoons. This was intended not merely for an amusement, but to remind youth of the highest rank how possible it is that they may fall into circumstances, in which it may be necessary for them to support life by such labours as these; which, to be sure, are vastly preferable to begging; or even to living upon a pension given as a reward to the merit of some honourable ancestor.

TRADE-WINDS, denote certain regular winds at sea, blowing either constantly the same way, or alternately this way and that; thus called from their use in navigation, and the Indian commerce. See WIND.

TRA′DED. *a.* (from *trade.*) Versed; practised (*Shakspeare*).

TRA′DEFUL. *a.* (*trade* and *full.*) Commercial; busy in traffic (*Spenser*).

TRADER. *s.* (from *trade*). 1. One engaged in merchandise or commerce (*Child*). 2. One long used in the methods of money-getting; a practitioner.

TRADESCANTIA, in botany, a genus of the class hexandria, order monogynia. Calyx three-leaved; petals three; filaments bearded with jointed hairs; capsule three-celled. Nineteen species: natives of the East or West Indies, of America or the Cape.

TRA′DESFOLK. *s.* (*trade* and *folk.*) People employed in trades (*Swift*).

TRA′DESMAN. *s.* (*trade* and *man.*) A shopkeeper (*Arbuthnot*).

TRADI′TION. *s.* (*tradition*, Fr. *traditio*, Latin.) 1. The act or practice of delivering accounts from mouth to mouth without written memorials (*Hooker*). 2. Any thing delivered orally from age to age (*Pope*).

TRADI′TIONAL. *a.* (from *tradition.*) 1. Delivered by tradition; descending by oral communication (*Tillotson*). 2. Observant of traditions, or idle rites: not used, nor proper (*Shakspeare*).

TRADI′TIONALLY. *ad.* (from *traditional.*) 1. By transmission from age to age (*Burnet*). 2. From tradition without evidence of written memorials (*Brown*).

TRADI′TIONARY. *a.* (from *tradition.*) Delivered by tradition; transmissive (*Tillotson*).

TRA′DITIVE. *a.* (*traditive*, Fr. from *trado*, Latin.) Transmitted or transmissible from age to age (*Dryden*).

To **TRADU′CE.** *v. a.* (*traduco*, Lat. *traduire*, French.) 1. To censure; to condemn; to represent as blamable; to calumniate; to decry (*Hooker*). 2. To propagate; to increase or continue by deriving one from another (*Hale*).

TRADU′CEMENT. *s.* (from *traduce.*) Censure; obloquy (*Shakspeare*).

TRADU'CER. *s.* (from *traduce.*) 1. A false censurer; a calumniator. 2. One who derives.

TRADU'CIBLE. *a.* (from *traduce.*) Such as may be derived (*Hale*).

TRADU'CTION. *s.* (from *traduce.*) 1. Derivation from one of the same kind; propagation (*Glanville*). 2. Tradition; transmission from one to another (*Hale*). 3. Conveyance; act of transferring (*Hale*). 4. Transition (*Bacon*).

TRAFALGAR, a promontory of Spain, in Andalusia, at the entrance of the strait of Gibraltar. Off this cape, October 11, 1805, admiral lord Nelson, with twenty-seven sail of the line, engaged the combined fleets of France and Spain, consisting of thirty-three sail of the line, nineteen of which were taken, sunk, or destroyed, and the French commander in chief, admiral Villeneuve, and two Spanish admirals, made prisoners: this unparalleled victory was obtained without the loss of one British ship; but the noble commander fell, by a musket ball, near the close of the engagement. This cape is 30 miles S.S.E. of Cadiz. Lon. 6. 2 W. Lat. 36. 11 N.

TRA'FFIC. *s.* (*trafique*, Fr. *traffico*, Ital.) 1. Commerce; merchandising; large trade; exchange of commodities (*Addison*). 2. Commodities; subject of traffic (*Gay*).

To **TRA'FFIC.** *v. n.* (*trafiquer*, Fr. *trafficare*, Ital.) 1. To practise commerce; to merchandise; to exchange commodities (*Bacon*). 2. To trade meanly or mercenarily (*Rowe*).

TRA'FFICER. *s.* (*trafiquer*, Fr. from *traffic.*) Trader; merchant (*Shakspeare*).

TRAGACANTHA. (τραγακανθα, from τραγον, a goat, and ακανϑα, a thorn; so called from its pods resembling the goat's beard.) Goat's-thorn. Milk-vetch. Astragalus tragacantha caudice arborescente, petiolis spinescentibus of Linnéus. C. O. diadelphia, decandria. Gum tragacanth, or gum dragant (which is forced from this plant by the intensity of the solar rays about mount Ida, where it is concreted into irregular lumps or vermicular pieces, bent into a variety of shapes, and larger or smaller proportions, according to the size of the wound from which it issues) differs from all other known gums in imparting to a very large quantity of water a thick and glutinous consistence. The demulcent qualities of this gum are to be considered as similar to those of gum arabic. (See ARABIC GUM.) It is seldom given alone, but frequently in combination with more powerful medicines, especially in the form of troches, for which it is peculiarly well adapted: it gives name to an officinal powder, and is an ingredient in the compound powder of ceruss.

TRAGACANTH GUM. See TRAGACANTHA, and ASTRAGALUS.

TRAGE'DIAN. *s.* (*tragoedus*, Latin.) 1. A writer of tragedy (*Stillingfleet*). 2. An actor of tragedy (*Dryden*).

TRAGEDY, a drama which represents some grand and serious action, and which has frequently a fatal issue or end. Its genuine object is to purify and moderate the passions, by exhibiting them in their excess, and to hold forth such a picture of the crimes and miseries of mankind as may teach us, by fear, to be prudent for our own sake; and, by compassion, to be charitable for the sake of others. To produce this effect, three principles are essential to tragedy: first, it should represent our fellow-creatures in peril and misfortune; secondly, the peril should inspire us with alarm and dread, and the misfortune should interest and affect us; and, thirdly, the imitation should be conformable to nature and truth; that, while it engages our attention, it may render even the emotions of sorrow pleasing to us. On these principles are founded all the rules which relate to the choice of a subject, to the delineation of characters, and to the composition of the fable, dialogue, and action.

All events and circumstances which seriously influence mankind, and excite the stronger passions, are fit subjects for tragedy. Such, in the language of our great poet, are

> "——The whips and scorns o'th' time;
> Th' oppressor's wrong, the proud man's contumely,
> The pangs of despis'd love, the law's delay,
> The insolence of office, and the spurns
> That patient merit of th' unworthy takes."

To these ills men in all conditions are liable, but it is seldom that the poet confines himself to a representation of them in common life, because the vicissitudes incident to greatness afford him wider scope to display them. Hence tragedy, as was before observed, is frequently the imitation of a grand action, involving some important state concern, the fall of a chief, or the acquisition of a crown. Such events naturally rouse the passions of ambition, love, hatred, and revenge; and are calculated more deeply to affect the heart with sentiments of terror and pity. But whatever be the subject, the actual representation of tragic scenes ought never to be carried to excess. Murder and suicide should be banished from the stage, or admitted only in extreme cases, because the terror and the pity which such sights inspire are mingled with a feeling of horror, at which human nature revolts.

Of the rules for the composition of tragedy, the most important respect the unities. See DRAMA and UNITIES.

By the intrigue is meant that concatenation of facts or incidents, whose perplexity arrests for a time the progress of the action. Thus, the difficulties attending a principal personage in the tragedy constitute what is properly called the intrigue: and it is this which keeps the spectator in suspense, and gradually raises his curiosity to the highest pitch by the variety of emotions, interests, and passions which it involves. For instance, in the tragedy of Othello, the circumstances attending the Moor's jealousy strengthen his suspicions by degrees, and render him "perplexed in the extreme." Here lies the intrigue of the piece.

The *denouement* is the unravelling of the intrigue. It ought to arise naturally from what precedes, and should be quite unforeseen, because all interest is sustained by the uncertainty of the mind, between fear and hope. There are instances, however, where the *denouement*, although foreseen, is nevertheless interesting. With regard to what is called poetical justice, we may observe, that although it may be most grateful to behold virtue triumphant and vice disgraced, yet the drama, to be a picture of human life, must sometimes exhibit the reverse; in these cases it will not be without its use, if it direct our view to "something after death."

The division into acts is purely arbitrary, and seems to have been unknown on the Grecian stage. Aristotle makes no such distinction; he speaks only of the duration of the piece, which has naturally only three parts, a beginning, a middle, and an end. Horace insists, that there shall be neither more nor less than five acts; and to this rule most of the moderns have adhered.

Of the style best adapted to tragedy, it were trite to say that it should be appropriate to the characters. It may be lofty, it may be elegant, but it must always appeal directly to the heart. The most pathetic scenes of our tragic poets are written in language very little elevated above the dialogue of real life, and to this language Shakspeare has, by a combination and a phraseology peculiar to himself, imparted new powers; for he has expressed in it some of the sublimest conceptions of human genius.

TRAGIA, in botany, a genus of the class monœcia, order triandria. Male: calyx three-parted; corolless. Fem.: calyx two-leaved; corolless; styles two; seed one. Three species: natives of Siberia.

TRA'GICAL. Tra'gic. *a.* (*tragicus*, Lat. *tragique*, French.) 1. Relating to tragedy (*Spenser*). 2. Mournful; calamitous; sorrowful; dreadful (*Sandys. Rowe*).

TRA'GICALLY. *ad.* (from *tragical.*) 1. In a tragical manner; in a manner befitting tragedy (*Dryden*). 2. Mournfully; calamitously; sorrowfully.

TRA'GICALNESS. *s.* (from *tragical.*) Mournfulness; calamitousness (*Dec. of Piety*).

TRAGICO'MEDY. *s.* (*tragicomedie*, Fr.) A drama compounded of merry and serious events (*Gay*).

TRAGICO'MICAL. *a.* (*tragicomique*, Fr.) 1. Relating to tragicomedy (*Gay*). 2. Consisting of a mixture of mirth with sorrow.

TRAGICO'MICALLY. *ad.* (from *tragicomical.*) In a tragicomical manner (*Bramst.*).

TRAGICUS. (*musculus tragicus.*) A proper muscle of the ear, which pulls the point of the tragus a little forward.

TRAGOPOGON. Goat's-beard. In botany, a genus of the class syngenesia, order polygamia æqualis. Receptacle naked; calyx simple, many-leaved; down feathered, on a pedicel. Twelve species, scattered over the globe. They are thus subdivided:

A. Possessing a stem, including the greater number.

B. Stemless; scapes radical.

The following are cultivated:

1. T. porrifolius. Purple goat's-beard, or salsafy.

2. T. pratensis, or common yellow goat's-beard.

3. T. crocifolius. Crocus-leaved goat's-beard.

4. T. dalechampii. Great-flowered goat's-beard.

The young stems of the second sort, which grows wild in our meadows, are eaten like asparagus, and are a pleasant and wholesome food. The root is also excellent, and was formerly used medicinally as a diuretic.

TRAGOSELINUM. (τραγοσελινον, from τραγος, a goat, and σελινον, parsley; named from its hairy coat, like the beard of a goat.) The burnet saxifrage was so called. See Rapinella.

TRAGUS. (τραγος, a goat; so called from its having numerous little hairs, or from its being hairy like the goat.) A small cartilaginous eminence of the auricula or external ear, placed anteriorly, and connected to the anterior extremity of the helix. It is beset with numerous little hairs, defending in some measure the entrance of the external auditory passage.

TRAJAN (Marcus Ulpius), a Roman emperor, born at Italica, in Spain. His great virtues, and his services to the empire, both as an officer, a governor, and a consul, recommended him to the notice of Nerva, who solemnly adopted him as his son, and invested him during his lifetime with the imperial purple. A little time after Nerva died, the election of Trajan to the vacant throne was confirmed by the unanimous rejoicings of the people, and the free concurrence of the armies on the confines of Germany, and the banks of the Danube. Most of the actions of Trajan shewed a benevolent prince. All the barbarians, except the Dacians, remained quiet. Decabalus, their warlike monarch, violated the treaty. The emperor upon this entered the enemy's country, by throwing a bridge across the rapid streams of the Danube, and a battle was fought in which the slaughter was so great, that in the Roman camp linen was wanted to dress the wounds of the soldiers. Trajan obtained the victory, and Decabalus, despairing of success, destroyed himself, and Dacia became a province of Rome. That the ardor of the Roman soldiers might not cool, an expedition was undertaken into the east, and Parthia threatened with immediate war. Trajan passed through Armenia, and made himself master of the provinces of Assyria and Mesopotamia. He extended his conquests as far as the extremities of India, and lamented that he possessed not the youth of Alexander, that he might add unexplored kingdoms to the Roman empire. This glory was transient. The return of the emperor towards Rome was hastened by indisposition; he stopped in Cilicia, and in the town of Selinus, afterwards called Trajanopolis, he was seized with a flux, and a few days after expired, in the beginning of August, A. D. 117, after a reign of nineteen years, six months, and fifteen days, in the 64th year of his age. He was succeeded on the throne by Adrian, whom the empress Plotina introduced to the Roman armies, as the adopted son of her husband. The ashes of Trajan were carried to Rome, and deposited under the stately column which he had erected a few years before, under the direction of the architect Apollodorus. Under this emperor the Romans enjoyed tranquillity, and for a moment supposed that their prosperity was complete under a virtuous sovereign.

It was to this Trajan that Pliny, during his proconsulship in Asia, wrote his celebrated letter (Epist. lib. x. ep. 97.) concerning the early Christians, describing their character, and asking how he was to treat them. Trajan's reply is thus finely ridiculed by the sarcastic Tertullian (Apologetic, ch. ii.). "On this information Trajan writes back, 'that such men as these were not to be searched after; but yet they are to be punished if brought before him.' O perplexity between reasons of state and justice! He declares us to be innocent, by forbidding us to be sought after, and at the same time commands us to be punished as criminals! What a mass of kindness and cruelty, connivance and punishment, is here blended in one act! Unhappy edict, thus to circumvent and hamper yourself in your own ambiguous answer! If you condemn us, why do you give orders against searching after us? And if you think it not right to search after us, why do you not acquit us? Soldiers are set to patrole in every province for the apprehending of robbers; and every private person feels himself justified in taking up arms against traitors and enemies of the commonwealth; and farther he is obliged to make enquiry after all the conspirators: but a Christian only is a criminal of so strange a kind, that no enquiry must be made for the purpose of finding him, and yet when found he may be brought to the tribunal; as if this enquiry were designed for any other purpose than to bring offenders to justice. You condemn him, therefore, when brought, whom your own edict forbids to be sought after!"

TRAJAN'S COLUMN, a famous historical column erected in Rome, in honour of the emperor Trajan. It is of the Tuscan order, though somewhat irregular: its height is eight diameters, and its pedestal Corinthian: it was built in a large square called Forum Romanum. Its base consists of twelve stones of an enormous size, and is raised on a socle, or foot, of eight steps: withinside is a staircase illuminated with forty-four windows. It is 140 feet high, which is thirty-five feet short of the Antonine column, but the workmanship of the former is much more valued. It is adorned from top to bottom with basso-relievos, representing the great actions of the emperor against the Dacians.

To TRAJE'CT. *v. a.* (*trajectus*, Lat.) To cast through; to throw (*Newton*).

TRAJE'CT. *s.* (*trajectus*, Latin.) A ferry; a passage for a water-carriage (*Shakspeare*).

TRAJE'CTION. *s.* (*trajectio*, Latin.) 1. The act of darting through (*Boyle*). 2. Emission (*Brown*).

TRAJECTORY, a term often used, generally for the path of any body moving either in a void, or in a medium that resists its motion; or even for any curve passing through a given number of points. Thus Newton, Princip. lib. 1. prob. 22, purposes to describe a trajectory that shall pass through five given points.

TRAJECTORY OF A COMET, is its path or orbit, or the line it describes in its motion. This path, Hevelius, in his Cometographia, will have to be very nearly a right line; but Dr. Halley concludes it to be, as it really is, a very eccentric ellipsis; though its place may often be well computed on the supposition of its being a parabola. Newton, in prop. 41 of his 3d book, shews how to determine the trajectory of a comet from three observations; and in his last prop. how to correct a trajectory graphically described.

TRAJETTO, a town of Naples, in Terra di Lavoro, built on the site of the ancient Minturna. Here are the ruins of an amphitheatre and aqueduct. It is seated near the mouth of the Garigliano, in the Mediterranean, 25 miles N.W. of Capua. Lon. 14. 4. Lat. 41. 20 N.

To TRAIL. *v. a.* (*trailler*, French.) 1. To hunt by the track. 2. To draw along the ground (*Dryden*). 3. To draw a long floating or waving body (*Pope*). 4. To draw; to drag (*Milton*).

To TRAIL. *v. n.* To be drawn out in length (*Dryden*).

TRAIL. *s.* (from the verb.) 1. Scent left on the ground by the animal pursued; track followed by the hunter (*Shakspeare*). 2. Any thing drawn to length (*Rowe*). 3. Any thing drawn behind in long undulations (*Pope*).

TRAILING, in botany. See PROCUMBENT.

TRAILING ARBUTUS, in botany. See EPIGŒA.

TRAILING, in hare-hunting, the tracking of a hare by her scent: by which in general she is started from her form. Soon after the hounds are thrown off, some of them, in the event of sport, give tongue. This the rest attend to, and their joining in the same track is called taking trail.

When it was the custom formerly to take the field as soon as the horsemen could see to ride, trail was the sure and certain means by which the hare was found; in a few minutes after the hounds were thrown off, a general clamour of trail ensued, and the inexpressible gratification of seeing all the clue of her night-work unravelled to a view was sport much superior to a bad chase. Trail is of much less import now, since harriers (at least in the centrical part of the kingdom) are seldom known to take the field before ten or eleven o'clock in the day, when the very slight and partial remains of trail can be but of small avail: the reliance now principally depends upon drawing over the ground most likely, according to the season, to offer the chance of a hare sitting, or the great probability of her jumping up before them. The paltry custom of field money for hares found sitting has very considerably warped the judgment from the sporting-like practice of finding the hare by trailing up to her; for the huntsman and whipper-in having caught the pecuniary infection, are poking and prying in every bush, in the hope of obtaining a few shillings, instead of attending to their hounds.

To TRAIN. *v. a.* (*trainer*, French.) 1. To draw along (*Milton*). 2. To draw; to entice; to invite (*Shakspeare*). 3. To draw by artifice or stratagem (*Shakspeare*). 4. To draw from act to act by persuasion or promise (*Shaksp.*). 5. To educate; to bring up (*Tillotson*). 6. To exercise, or form to any practice by exercise (*Dryden*).

TRAIN. *s.* (*train*, French.) 1. Artifice; stratagem of enticement (*Spenser*). 2. The tail of a bird (*Ray*). 3. The part of a gown that falls behind upon the ground (*Shaksp.*). 4. A series; a consecution (*Watts*). 5. Process; method; state of procedure (*Sw.*). 6. A retinue; a number of followers (*Shakspeare*). 7. An orderly company; a procession (*Dry.*).

TRAIN, a line of gunpowder laid to give fire to a quantity thereof, in order to do execution by blowing up earth, works, buildings, &c.

TRAIN OF ARTILLERY, includes the great guns and other pieces of ordnance belonging to an army in the field.

TRAIN, or THRAN-OIL. A general term given to those coarser animal oils which are obtained from the larger fishes or marine animals, as the whale, dolphin, and shark tribes. The more usual train-oils, produced from the peculiar fat, called blubber, of these animals, is a fluid of about the consistence of syrup, and, in different manufactures, is employed for various purposes. Few analytical experiments, however, have been made upon train-oil: yet Dr. Priestley turned his attention in some degree towards it, in consequence of an attempt to confine the nitrous acid vapour by means of animal oil, and especially that of the whale. He found that on mixing nitrous vapour and nitrous air with this oil it became hot, and was changed to a green colour; on cooling it became red, and coagulated; and when mixed with other oil, separated from it, and sunk to the bottom, exactly like the ice of oil, and continued there without mixing with the rest of the oil. On making a quantity of alkaline air pass through the oil, saturated with nitrous vapour, in order to mix it with some air that had issued from it, the oil, from being red, became almost perfectly black.

A part of the whale-oil that had been used in his first attempts to confine the nitrous acid vapour, of a dark red colour, and coagulated, being melted and put into another phial, and then impregnated again with fresh nitrous vapour, became of a deep blue colour. In cooling this exhibited a dirty green, then inclined to a yellow, became a little fluid, and continued so.

A quantity of fresh whale oil became blue by this mode of impregnation. On cooling, the upper part became stiff, and assumed a light orange colour, while the lower part still continued blue and florid: but it became at length of a deep orange, and was perfectly coagulated throughout. The oil, about two months after impregnation, on being melted, retained the same colour, and its peculiar smell, though mixed with that of the spirit of nitre.

From his experiments upon this and other oils, he found that all of them readily decompose nitrous air, as well as imbibe nitrous vapour; that in consequence of this impregnation they are in general coagulated, and become of a red colour; and that in all cases in which nitrous air is decomposed, Dr. Priestley found it reduced to the state of phlogisticated air. It is in this way that he explains the phenomena which took place in his experiments on the whale oil. But the phenomena attending the processes, from the first to the last stage of impregnation, are very various and remarkable. They are best purified by means of fixed alkali and chalk, which have a tendency to throw down the albumen and gluten.

TRAINBA'NDS. *s.* (*train* and *band.*) The militia; the part of a community trained to martial exercise (*Clarendon*).

TRAINBE'ARER. *s.* (*train* and *bearer.*) One that holds up a train.

TRAINING OF TREES, in gardening, the artificial direction of their shoots to a definite form and arrangement against the sides of walls, pales, reeding, or other fence. This should be commenced when they are a year old from the time of grafting or budding, and especially if designed for espaliers.

In the nurseries large quantities of these kind of trees are always kept ready for sale; particularly peaches, nectarines, apricots, cherries and plums for walls; and apples, pears, and similar trees for espaliers; and are highly useful in furnishing the walls and espaliers of new gardens, and occasionally those of old ones, to bear fruit, till younger trees, planted untrained, become fruitful; or for supplying the places of old trees that fail, or bear bad fruit.

When it is intended to raise trained fruit-trees for walls and espaliers, a quantity of the best young plants of the respective sorts, dwarf, and half-standards, of one year old, with the first shoots from the budding and grafting entire, should be planted out in autumn against some kind of fence, in a free open situation, not less than four or five feet high, placing them from five or six to eight or ten feet distant, to remain for training. These in the spring following, just as they make an effort for shooting, should be headed down, with a clean, sloping cut upwards, to within four, five, or six eyes or buds of their origin, or place of insertion in the stock, especially those intended for dwarfs, and the half standards, if worked on tall stocks; which prevents their running up too high with a single naked stem, and causes them to throw out lateral shoots from the lower part, to fill the wall or espalier regularly with branches, quite from the bottom upwards; as they soon after push forth strong shoots from all the remaining lower buds, sufficient to give the tree its first proper formation as a wall tree, &c.; which shoots, when advanced in length in summer, should be trained along to the fence, equally to the right and left, in a somewhat inclined position at full length, till next spring, when these shoots may also be cut down to six or eight inches length, to force out a farther supply of more branches near the bottom, in order to cover the wall below. See GARDENING.

TRA'INY. *a.* (from *train.*) Belonging to train oil. A bad word (*Gay*).

To TRAIPSE. *v. a.* (a low word.) To walk in a careless or sluttish manner (*Pope*).

TRAIT. *s.* (*trait,* Fr.) A stroke; a touch (*Broome*).

TRA'ITOR. *s.* (*traitre,* French; *traditor,* Latin.) One who being trusted betrays.

TRA'ITORLY. *a.* (from *traitor.*) Treacherous; perfidious (*Shakspeare*).

TRA'ITOROUS. *a.* (from *traitor.*) Treacherous; perfidious; faithless (*Ben Jonson*).

TRA'ITOROUSLY. *ad.* In a manner suiting traitors; perfidiously (*Donne*).

TRA'ITRESS. *s.* (from *traitor.*) A woman who betrays (*Dryden*).

TRALATI'TIOUS. *a* (from *translatus,* Lat.) Metaphorical; not literal.

TRALATI'TIOUSLY. *ad.* Metaphorically; not literally (*Holder*).

TRALEE, a borough of Ireland, capital of the county of Kerry. Near it is a chalybeate spring. It stands on a small river, which flows into a shallow bay of its name, 50 miles S.W. of Limerick. Lon. 10. 0 W. Lat. 52. 4 N.

To TRALI'NEATE. *v. n.* (*trans* and *linea.*) To deviate from any direction (*Dryd.*).

TRAMEL, or TRAMMEL, in the manage, a machine or contrivance for teaching a horse to amble. In books on this subject it is directed to be formed after the following manner: 1. "The side-ropes must be made of strong packthread, twisted into a delicate strong cord, about the thickness of a small jack-line, with a noose or loop at each end. They should not be twisted too hard, but gently, and with an elastic quality, which will prevent the trammel from breaking. These side-ropes must be, in length, thirty-six inches, for a horse of an ordinary stature; and either longer or shorter, according to his size, and quite equal one with another. 2. Hose must be placed on the small of the fore-leg, and the small of the hinder-leg above the pastern-joint; and these must be made of fine girth-web, that is soft and pliant, and joined with double cotton. Over the girth-web must be fastened strong tabbs of white neat's-leather well tallowed, suited to an equal length, and stamped with holes at equal distances, which may pass through the nooses of the side-ropes, and be made longer or shorter at pleasure, with very strong buckles. These hose are also to be made fast about the horse's legs, with small buckles, and the hose of the girth should be four inches in length, and the long tabbs with the large buckles ten inches. 3. The back-band, which is for no other use but to bear up the side-ropes, should, if you tramel all four legs, be made of fine girth-web, and lined with cotton; but if you tramel only one side, then a common tape will serve, taking care that it carries the side-ropes in an even line, without either rising or falling: for if it rises it shortens the side-rope, and if it falls there is danger of its entangling."

TRAMELLED. In the manage, a horse is said to be tramelled that has blazes or white marks upon the fore and hind feet on one side, as the far-foot before and behind. He is thus called from resemblance of the white foot to the hose of a half-tramel. A cross-tramelled horse is one that has white marks on two of his feet, that stands crosswise like St. Andrew's cross; as in the far fore-foot, and the near hind-foot; or in the near-foot before, and the far-foot behind.

TRAMMELS, in mechanics, an instrument used by artificers for drawing ovals upon boards, &c. One part of it consists of a cross with two grooves at right angles; the other is a beam carrying two pins which slide in those grooves, and also the describing pencil. All the engines for turning ovals are constructed on the same principles with the tramınels: the only difference is, that in the trammels the board is at rest, and the pencil moves upon it; in the turning engine, the tool, which supplies the place of the pencil, is at rest, and the board moves against it. See a demonstration of the chief properties of these instruments by Mr. Ludlam, in the Philos. Trans. vol. lxx. p. 378, &c. or New Abridgment, vol. xiv. p. 700—704.

TRAMMEL-NET, is a long net, wherewith to take fowl by night in champaign countries, much like the net used for the low bell, both in shape, bigness, and mashes. To use it, they spread it on the ground, so that the nether or further end, fitted with small plummets, may lie loose thereon; then the other part being borne up by men placed at the fore ends, it is thus trailed along the ground. At each side are carried great blazing lights, by which the birds are raised, and as they rise under the net they are taken.

To TRA'MMEL. *v. a.* (from the noun.) To catch; to intercept (*Shakspeare*).

To TRA'MPLE. *v. a.* (*trampe,* Danish.) To tread under foot with pride, contempt, or elevation (*Milton*).

To TRA'MPLE. *v. n.* 1. To tread in contempt (*Gov. of the Tongue*). 2. To tread quick and loudly (*Dryden*).

TRA'MPLER. *s.* One that tramples.

TRANA'TION. *s.* (*trano,* Latin.) The act of swimming over.

TRANCE. *s.* (*transe,* Fr. *transitus,* Lat.) An ecstacy; a state in which the soul is wrapt into visions of future or distant things (*Milt.*).

TRA'NCED. *a.* (from *trance.*) Lying in a trance or ecstacy.

TRANCHEFILE, in the manage, the cross-chain of a bridle that runs along the bitmouth from one branch to the other.

TRANI, a city of Naples, in Terra di Bari, the see of an archbishop, and the usual residence of the governor of the province, which is sometimes called Terra di Trani. It is much decayed since the harbour has been choaked up, and stands on the gulf of Venice, 26 miles W. by N. of Bari, and 125 N. by E. of Naples. Lon. 16. 36 E. Lat. 41. 18 N.

TRA'NNEL. *s.* A sharp pin (*Moxon*).

TRANQUEBAR, a seaport of Hindustan, in the country of Tanjore, with a fort and factory, belonging to the Danes, who pay an annual rent to the rajah. The town is surrounded by a wall and bastions; and contains three Christian churches, a large mosque for the Mahometans, and several pagodas for the Gentoos. In 1807, it was taken by the English. It is seated at the mouth of the Cavery, 165 miles S. of Madras. Lon. 79. 53 E. Lat. 11. 1 N.

TRA'NQUIL. *a.* (*tranquille*, French; *tranquillus*, Latin.) Quiet; peaceful (*Shaks.*).

TRANQUI'LLITY *s.* (*tranquillitas*, Lat.) Quiet; peace of mind; peace of condition; freedom from perturbation (*Pope*).

To TRANSA'CT. *v. a.* (*transactus*, Latin.) 1. To manage; to negociate; to conduct a treaty or affairs. 2. To perform; to do; to carry on (*Addison*).

TRANSA'CTION. *s.* (from *transact.*) Negociation; dealing between man and man; management (*Clarendon*).

TRANSACTIONS (Philosophical), are a collection of the principal papers and matters read before certain philosophical societies, as the Royal Society of London, and the Royal Society of Edinburgh. These Transactions contain the several discoveries and histories of nature and art, either made by the members of those societies, or communicated by them from their correspondents, with the various experiments, observations, &c. made by them, or transmitted to them, &c.

The Philosophical Transactions of the Royal Society of London were set on foot in 1665, by Mr. Oldenburg, the then secretary of that society, and were continued by him till the year 1677. They were then discontinued upon his death, till January 1678, when Dr. Grew resumed the publication of them, and continued it for the months of December 1678, and January and February 1679, after which they were intermitted till January 1683. During this last interval their want was in some measure supplied by Dr. Hook's Philosophical Collections. They were also interrupted for three years, from December 1687 to January 1691, beside other smaller interruptions amounting to near a year and a half more, before October 1695, since which time the Transactions have been carried on regularly to the present day, with various degrees of credit and merit.

Till the year 1752 these Transactions were published in numbers quarterly, and the printing of them was always the single act of the respective secretaries till that time; but then the society thought fit that a committee should be appointed to consider the papers read before them, and to select out of them such as they should judge most proper for publication in the future Transactions. For this purpose the members of the council for the time being constitute a standing committee: they meet on the first Thursday of every month, and no less than seven of the members of the committee (of which number the president, or in his absence a vice-president, is always to be one) are allowed to be a quorum, capable of acting in relation to such papers; and the question with regard to the publication of any paper, is always decided by the majority of votes taken by ballot.

They are published annually, in two parts, at the expence of the society; and each fellow, or member, is entitled to receive one copy gratis of every part published after his admission into the society. For many years past, the collection, in two parts, has made one volume in each year; and in the year 1812 the number of the volumes was 102.

There is also a very useful abridgment of those volumes of the Transactions that were published before the year 1752, when the society began to publish the Transactions on their own account. Those to the end of the year 1700 were abridged, in three volumes, by Mr. John Lowthorpe; those from the year 1700 to 1720, were abridged, in 2 volumes, by Mr. Henry Jones; and those from 1719 to 1733 were abridged, in 2 volumes, by Mr. John Eames and Mr. John Martyn: Mr. Martyn also continued the abridgment of those from 1732 to 1744, in 2 volumes, and of those from 1744 to 1750, in 2 volumes; making in all 11 volumes.

Another very valuable abridgment has been recently published by Drs. Hutton, Shaw, and Pearson, in 18 vols. 4to. with various notes, critical, scientific, and biographical: and Dr. Thomson has since given what may be regarded as an abridged sketch of the Transactions in his very interesting History of the Royal Society, in one volume 4to.

The Royal Society of Edinburgh, instituted in 1783, have also published 10 volumes of their Philosophical Transactions, which are deservedly held in the highest respect for the importance of their contents.

The Society of Arts, &c. have likewise published about 30 volumes of Transactions in 8vo. abounding with mechanical inventions, discoveries in chemistry, &c. There are also Transactions of the American Society, of the Manchester Philosophical Society, of the Connecticut Society. The Irish Academy, and most of the foreign philosophical societies, give to their Transactions the title of Memoirs.

TRANSANIMA'TION. *s.* (*trans* and *anima.*) Conveyance of the soul from one body to another (*Brown*).

To TRANSCE'ND. *v. a.* (*transcendo*, Latin.) 1. To pass; to overpass (*Davies*). 2. To surpass; to outgo; to exceed; to excel (*Waller*). 3. To surmount; to rise above.

To TRANSCE'ND. *v. n.* 1. To climb: not in use (*Brown*). 2. To surpass thought (*Hammond*).

TRANSCE'NDENCE. TRANSCE'NDENCY. *s.* (from *transcend.*) 1. Excellence; unusual excellence; supereminence. 2. Exaggeration; elevation beyond truth (*Bacon*).

TRANSCE'NDENT. *a.* (*transcendens*, Latin.) Excellent; supremely excellent; passing others (*Rogers*).

TRANSCENDE'NTAL. *a.* (*transcendentalis*, low Latin.) 1. General; pervading many particulars. 2. Supereminent; passing others (*Grew*).

TRANSCENDENTAL QUANTITIES, among geometricians, are indeterminate ones; or such as cannot be expressed or fixed to any constant equation: such is a transcendental curve, or the like.

M. Leibnitz has a dissertation in the Acta Erud. Lips. in which he endeavours to shew the origin of such quantities; viz. why some problems are neither plain, solid, nor sursolid, nor of any certain degree, but do transcend all algebraical equations.

He also shews how it may be demonstrated without calculus, that an algebraic quadratrix for the circle or hyperbola is impossible: for if such a quadratrix could be found, it would follow, that by means of it any angle, ratio, or logarithm, might be divided in a given proportion of one right line to another, and this by one universal construction: and consequently the problem of the section of an angle, or the invention of any number of mean proportionals, would be of a certain finite degree. Whereas the different degrees of algebraic equations, and therefore the problem understood in general of any number of parts of an angle, or mean proportionals, is of an indefinite degree, and transcends all algebraical equations.

Others define transcendental equations to be such fluxional equations as do not admit of fluents in common finite algebraical equations, but are expressed by means of some curve, or by logarithms, or by infinite series; thus the expression $\dot{y} = \frac{\dot{x}}{\sqrt{aa - xx}}$ is a transcendental equation, because the fluents cannot both be expressed in finite terms. And the equation which expresses the relation between an arc of a circle and its sine is a transcendental equation; for Newton has demonstrated that this relation cannot be expressed by any finite algebraic equation, and therefore it can only be by an infinite or a transcendental equation.

It is also usual to rank exponential equations among transcendental ones; because such equations, although expressed in finite terms, have variable exponents, which cannot be expunged but by putting the equation into fluxions, or logarithms, &c. Thus, the exponential equation $y = a^{x}$, gives $x \times \log. a = \log. y$, or $\dot{x} \times \log. a = \frac{\dot{y}}{y}$.

TRANSCENDENTAL CURVE, in the higher geometry, is such a one as cannot be defined by an algebraic equation; or of which, when it is expressed by an equation, one of the terms is a variable quantity, or a curve line. And when such curve line is a geometrical one, or one of the first degree or kind, then the transcendental curve is said to be of the second degree or kind, &c.

Thus, if y denote the ordinate and x the abscissa, and if the properties of the curve be included in one of the equations $y = \log. x$, or $y = \text{A} \sin. x$, or $y = \text{A} \cos. x$, or $y = \text{A} \tan. x$, or $y = x^{\sqrt{2}}$, &c. the respective curve will be transcendental.

These curves are the same with what Des Cartes, and others after him, call mechanical curves, and which they would have excluded out of geometry; contrary, however, to the opinion of Newton and Leibnitz; for as much as, in the construction of geometrical problems, one curve is not to be preferred to another as it is defined by a more simple equation, but as it is more easily described than that other: besides, some of these transcendental, or mechanical curves, are found of greater use than almost all the algebraical ones.

M. Leibnitz, in the Acta Erudit. Lips. has given a kind of transcendental equations, by which these transcendental curves are actually defined, and which are of an indefinite degree, or are not always the same in every point of the curve. Now whereas algebraists use to assume some general letters or numbers for the quantities sought, in these transcendental problems Leibnitz assumes general or indefinite equations for the lines sought; thus, for example, putting x and y for the absciss and ordinate, the equation he uses for a line required, is $a + bx + cy + exy + fxx + gyy$, &c. $= 0$: by the help of which indefinite equation, he seeks for the tangent; and comparing that which results with the given property of tangents, he finds the value of the assumed letters a, b, c, &c. and thus defines the equation of the line sought.

If the comparison abovementioned do not succeed, he pronounces the line sought not to be an algebraical, but a transcendental one.

This supposed, he proceeds to find the species of transcendency: for some transcendentals depend on the general division or section of a ratio, or upon logarithms, others upon circular arcs, &c.

Here then, beside the symbols x and y, he assumes a third, as v, to denote the transcendental quantity; and of these three he forms a general equation of the line sought, from which he finds the tangent according to the differential method, which succeeds even in transcendental quantities. This found, he compares it with the given properties of the tangents, and so discovers not only the values of a, b, c, &c. but also the particular nature of the transcendental quantity.

Transcendental problems are very well

managed by the method of fluxions. Thus, for the relation of a circular arc and right line, let *a* denote the arc, and *x* the versed sine, to the radius 1, then is $a =$ fluent of $\frac{\dot{x}}{\overline{2x-xx}}$; and if the ordinate of a cycloid be *y*, then is

$$y = \sqrt{2x - xx} + \text{fluent of } \frac{\dot{x}}{\sqrt{2x - xx}}.$$

Thus is the analytical calculus extended to those lines which have hitherto been excluded, for no other cause but that they were thought incapable of it.

A very ingenious disquisition on transcendental curves is that given by Euler, Anal. Infinit. vol. ii. ch. 21.

TRANSCE′NDENTLY. *ad.* (from *transcendent.*) Excellently; supereminently (*Sou.*).

To TRA′NSCOLATE. *v. a.* (*trans* and *colo*, Latin.) To strain through a sieve or colander; to suffer to pass, as through a strainer (*Harvey*).

To TRANSCRI′BE. *v. a.* (*transcribo*, Lat. *transcrire*, French.) To copy; to write from an exemplar (*Clarendon*).

TRANSCRI′BER. *s.* (from *transcribe.*) A copier; one who writes from a copy (*Add.*).

TRA′NSCRIPT. *s.* (*transcriptum*, Latin.) A copy; any thing written from an original.

TRANSCRI′PTION. *s.* (from *transcriptus*, Latin.) The act of copying (*Brerewood*).

TRANSCRI′PTIVELY. *ad.* (from *transcript.*) In manner of a copy (*Brown*).

To TRANSCU′R. *v. n.* (*transcurro*, Lat.) To run or rove to and fro (*Bacon*).

TRANSCU′RSION. *s.* (from *transcursus*, Latin.) Ramble; passage through; passage beyond certain limits (*Wotton*).

TRANSE. *s.* (See TRANCE.) A temporary absence of the soul; an ecstacy (*Milton*).

TRANSELEMENTA′TION. *s.* (*trans* and *element.*) Change of one element into another (*Burnet*).

TRANSE′XION. *s.* (*trans* and *sexus*, Lat.) Change from one sex to another (*Brown*).

To TRA′NSFER. *v. a.* (*transfero*, Latin.) 1. To convey; to make over from one to another (*Prior*). 2. To remove; to transport.

TRA′NSFER. *s.* A change of property; a delivery of property to another.

TRANSFE′RRER. *s.* He that transfers.

TRANSFIGURA′TION. *s.* (*transfiguration*, French.) 1. Change of form (*Brown*). 2. The miraculous change of our blessed Saviour's appearance on the mount (*Addison*).

To TRANSFI′GURE. *v. a.* (*trans* and *figura*, Latin.) To transform; to change with respect to outward appearance (*Boyle*).

To TRANSFI′X. *v. a.* (*transfixus*, Latin.) To pierce through (*Fenton*).

To TRANSFO′RM. *v. a.* (*trans* and *forma*, Latin.) To metamorphose; to change with regard to external form (*Davies*).

To TRANSFO′RM. *v. n.* To be metamorphosed (*Addison*).

TRANSFORMA′TION. *s.* (from *transform.*) Change of shape; act of changing the form; state of being changed with regard to form; metamorphosis (*Watts*).

TRANSFORMATION, in geometry, is the changing or reducing of a figure, or of a body, into another of the same area, or the same solidity, but of a different form. As, to transform or reduce a triangle to a square, or a pyramid to a parallelopipedon.

TRANSFORMATION OF EQUATIONS, in algebra, is the changing equations into others of a different form, but of equal value. This operation is often necessary, to prepare equations for a more easy solution.

TRANSFRETA′TION. *s.* (*trans* and *fretum*, Latin.) Passage over the sea (*Davies*).

To TRANSFU′SE. *v. a.* (*transfusus*, Lat.) To pour out of one into another (*Hooker*).

TRANSFU′SION. *s.* (*transfusus*, Latin.) The act of pouring out of one into another (*Dryden*).

TRANSFUSION OF BLOOD, in physiology, the introduction of the blood of one animal into the vascular system of another. Towards the end of the seventeenth century much attention was paid by philosophers to this subject. It was first started in consequence of a set of experiments made by sir Christopher Wren, while Savilian professor at Oxford. He injected liquids of various kinds into the blood-vessels of dogs, in order to determine the effects which each liquid would produce upon the animal. Soon after Dr. Lower exhibited, at Oxford, the transfusion of blood from one dog to another, by means of quills inserted in the carotid artery of the one and into the jugular vein of the other dog. Dr. King next suggested the possibility of transfusing the blood from the vein instead of from the artery. About a year afterwards the experiment was made at Paris, by Dr. Denys, upon a man who had the blood of an animal transfused into him, while his own blood was allowed to flow out. The experiment was attended with no inconvenience whatever to the person upon whom it was made. The humoral pathology, or that which ascribes the existence and nature of diseases to a vitiation of the fluids, rather than of the solids, was at this time in vogue; and it was conceived, that the blood being the chief of these fluids, and the basis of all the rest, diseases might easily be got rid of by drawing off the morbid blood, and substituting healthy blood from a sound animal. In the earlier volumes of the Philosophical Transactions, there are not less than eleven papers upon this subject. A controversy was even begun between the French and English philosophers in regard to it, each claiming for his own country the merit of having first started the happy idea. It was, however, at length agreed upon that the first idea belonged to Dr Lower; that the British physiologists first tried the experiment upon lower animals, and the French upon man. The expected advantages resulting from this practice have been long known to be visionary, as to the original purposes to which it was applied; but from later experiments of sir Busick Harwood, it appears probable that it may be advantageously resorted to, whenever an opportunity offers, to prevent the fatal effects resulting from violent and sudden hæmorrhages. Upon this subject we shall beg leave to copy the following brief account of sir Busick's experiments, as given in a note subjoined to one of the papers upon the transfusion of blood, in vol. I. p. 185, of the Philosophical Transactions Abridged.

" Dr. Harwood, the present professor of anatomy in the university of Cambridge, having perused the accounts of Lower and others concerning the transfusion of the blood, and being equally dissatisfied with the mode in which former experiments had been conducted, and the superstition and prejudice which occasioned the subsequent relinquishment of the practice, was induced in the year 1785 to make it the subject of his Thesis, preparatory to taking his M. B. degree in that year. Upon this occasion the professor made a number of very interesting experiments, which he has since repeated in a great variety of forms, some of them having been privately conducted, and others publicly exhibited at his lectures on comparative anatomy in the schools of the university. From a great number of very curious experiments, the following have been selected, and we have the professor's permission to lay them before the public.

" Experiment 1. A dog of middling size, from whose jugular vein eight ounces of blood had been previously evacuated, was supplied with an equal quantity from the carotid artery of a sheep. During the operation the dog showed evident marks of uneasiness, but was little affected in any other way, till about 24 hours after the operation, when he had a shivering fit, succeeded by a considerable degree of heat, thirst, and the usual symptoms of fever, all of which disappeared in the course of the next day, and the dog remained afterwards in perfect health. This experiment being several times repeated, and the quantity of transfused blood being occasionally increased or diminished, the feverish symptoms were observed to be more or less violent in proportion to the quantity of arterial blood introduced into the vein of the recipient animal. It now occurred to Dr. H. that the uneasiness of the animal during the operation, and the febrile disease with which he was attacked some hours afterwards, might probably arise from the preternatural degree of stimulus occasioned by the introduction of the highly oxygenated arterial blood into the right side of the heart.

" Experiment 2. The experiment was therefore repeated, with this difference, that the blood was conducted through the tube from the jugular vein of the sheep, instead of an artery. The result was exactly what the operator expected it to be, the animal was perfectly composed during the operation, and did not suffer the smallest inconvenience at any time afterwards.

" Experiment 3. Two pounds of blood were taken from a large pointer who had been previously weighed, and three pounds of sheep's blood from the jugular vein introduced. Dr. Harwood had been in the habit of letting out the superabundant blood when any of the animals had received too much, but in this experiment it was suggested by the Rev. Mr. Midcalf, then fellow of Christ's college, that it would be curious to observe the effect which would follow such an extraordinary degree of artificial plethora as the introduction of an additional pound of blood (into the circulating system of an animal who had naturally not more than five) must necessarily occasion. The vein was accordingly secured in the usual way, and the dog being released ran into the court, and immediately attempted to relieve himself from this unusual plenitude by every possible evacuation. His efforts to accomplish this purpose not proving successful, he became still more uneasy and restless, and afterwards drowsy and stupid. These symptoms were succeeded or rather accompanied by a considerable degree of fever, which terminated in a copious evacuation of blood by stool, by urine, and by vomiting. He took no nourishment for three days after the operation, except pure water, and was more reduced than Dr. H. ever saw an animal in that space of time. He now drank a little milk, and afterwards some broth, from which time he gradually recovered his appetite and strength, and remained in good health for several years.

" Experiment 4. All the blood of a pointer was let out (as far as it was possible to evacuate it) till the animal was in convulsions on the table, and apparently expiring. The blood was then transfused from the jugular of a sheep into the correspondent vein of the dog, and in less than half a minute after the introduction of the tube, he began to respire; and as soon as he had received a quantity of sheep's blood equal to what he had lost of his own, he leaped from the table and walked home, without experiencing any apparent inconvenience either then or at any subsequent period. This experiment was performed before a very crowded meeting at the public schools in the botanic garden of the university. It has been frequently repeated since, and a variety of other animals have been subjected to the same experiments, and with equal success.

" As the nature of our design will not admit of our relating a greater number of professor Harwood's experiments, we shall close this article with a few pathological remarks from that gentleman.

" From all the numerous experiments which have been lately made upon this subject one important fact seems to be fully established, that the blood of an herbivorous animal may be substituted for that of a carnivorous animal, and vice versa, without danger, or even inconvenience to the animal who receives it. In cases, therefore, of such copious evacuations of blood as to threaten the death of the patient, would not tranfusion be expedient? and if death should be inevitable without it, does it not become a duty to make the trial?

" Professor Harwood is at present engaged in a course of experiments to ascertain whether diseases may be communicated, or medicines conveyed into the system, by the transfusion of diseased or medicated blood from one animal to another; which he will probably publish at some future time, together with a description of the easiest mode of performing the operation, and answers to all the objections which have hitherto been urged against the application of it on the human subject."

To TRANSGRE′SS. *v. a.* (*transgressus*, Latin.) 1. To pass over; to pass beyond (*Dryden*). 2. To violate; to break (*Wake*).

To TRANSGRE′SS. *v. n.* To offend by violating a law (*Wisdom*).

TRANSGRE′SSION. *s.* (*transgression*, Fr. from *transgress.*) 1. Violation of a law; breach of a command (*South*). 2. Offence; crime; fault (*Shakspeare*).

TRANSGRE′SSIVE. *a.* (from *transgress.*) Faulty; culpable; apt to break laws (*Brown*).

TRANSGRE′SSOR. *s.* (*transgresseur*, Fr.) Lawbreaker; violator of command; offender (*Clarendon*).

TRA′NSIENT. *a.* (*transiens*, Lat.) Soon past; soon passing; short; momentary (*Pope*).

TRA′NSIENTLY. *ad.* In passage; with a short passage; not with continuance (*Dryden*).

TRA′NSIENTNESS. *s.* (from *transient.*) Shortness of continuance; speedy passage (*Decay of Piety*).

TRANSI′LIENCE. TRANSI′LIENCY. *s.* (from *transilio*, Latin.) Leap from thing to thing (*Glanville*).

TRANSIT, in astronomy, signifies the passage of any planet, just by or over a fixed star, or the sun; and of the moon in particular, covering or moving over any planet.

The transits of Mercury and Venus over the sun's disc are very interesting phænomena, not merely by reason of their rare and singular appearance, but because of their use in determining the parallax of the sun, and thence the real dimensions of the earth's orbit. Hence the times when these transits are to be seen have been very carefully computed.

The following are the days and years when there was or will be transits of Mercury, from the years 1753 to 1894 inclusive.

1753 - -	May 5.	1832 - -	May 5.
1756 - -	Nov. 6.	1835 - -	Nov. 7.
1769 - -	Nov. 9.	1845 - -	May 8.
1776 - -	Nov. 2.	1848 - -	Nov. 9.
1782 - -	Nov. 12.	1861 - -	Nov. 11.
1786 - -	May 5.	1868 - -	Nov. 4.
1789 - -	Nov. 5.	1878 - -	May 5.
1799 - -	May 7.	1881 - -	Nov. 7.
1802 - -	Nov. 8.	1891 - -	May 9.
1815 - -	Nov. 11.	1894 - -	Nov. 10.
1822 - -	Nov. 4.		

It appears from this table that the transits of Mercury always occur either in May or in November; but they happen much the most frequently in the latter month. The difference depends upon the position of the elliptic projection of Mercury's orbit upon the plane of the ecliptic. This ellipse is now so placed that it presents to us its perihelion during the winter, and its aphelion during the summer; and as it is very eccentric, Mercury is much nearer the sun in the month of November than in the month of May. Now if we consider the luminous cone formed by the visual rays drawn from the earth to the sun, this cone is contracted in the vicinity of the earth while it is enlarged near the sun, the disc of which serves for its base: Mercury ought therefore to cut it more readily when it is near the sun than when it is remote from it; and, consequently, the transits of Mercury ought to occur most frequently in the winter part of the year.

The transit of Mercury, Nov. 8, 1802, was observed at various places, at the times specified below. The table also contains the quantity of the reduction, and the effect of parallax in longitude and latitude.

	Apparent Time at Observation.			Reduction.	Observations Reduced.			Longitude from Greenwich.			Parallax in Long.	Parallax in Lat.	Names of the Observers.
	h.	m.	s.	s.	h.	m.	s.	h.	m.	s.	s.	s.	
Paris	0	7	34	—17·398	0	7	16·6	0	9	24·3	0·9781	3·615	Mean of all.
Gotha	0	41	15·8	—14·3	0	41	1·5	0	43	9·2	0·6348	3·771	Baron Von Zach.
Utrecht	0	18	40·5	—16·8	0	18	23·7	0	20	31·4	0·8933	3·735	M. Von Utenhaven Calkoen.
Leyden	0	15	53	—17·1	0	15	35·9	0	17	43·6	0·9238	3·727	M. Von Beack.
Greenwich	23	58	11	—18.7	23	57	52·3				1·1095	3·653	T. Firminger.

M. Von Zach observed the interior contact only, which must be reduced by allowing 1*m.* 30*s.* for the time between the contacts; and reduced to apparent time it gives 0*h.* 41*m.* 15·8*s.* for the time at observation.

The shortest distance of the centres, combined with the distance at the moment of the egress, gives the middle of the transit at 21*h.* 14*m.* 28·6*s.* and hence the time of apparent conjunction at 21*h.* 16*m.* 2·1*s.*: but as the aberration of the sun is — 20″·2, and that of Mercury + 18″·35, the true conjunction took place 6*m.* 35·3*s.* sooner, or at 21*h.* 9*m.* 26·8*s.* apparent time, when the sun's true place from the mean equinox, by Mayer's tables, was 7*s.* 16° 17′ 13″·3, or 7*s.* 16° 17′ 8″·5, if we take into account the correction to be made in the tables which the Greenwich observations make −5″ nearly. Hence the place of the node is found to be 1*s*. 15° 58′ 56″·3.

Transits of Venus across the sun's disc happen much less frequently than those of Mercury, because Venus is more distant from the sun. The following are all that will occur between 1631 and 2110.

1631	Dec. 6.	1874	Dec. 8.
1639	Dec. 4.	1882	Dec. 6.
1761	June 5.	2004	June 7.
1769	June 3.	2109	Dec. 10.

Now the chief use of these conjunctions is accurately to determine the sun's distance from the earth, or his parallax, which astronomers have in vain attempted to find by various other methods; for the minuteness of the angles required easily eludes the nicest instruments. But in observing the ingress of Venus into the sun, and her egress from the same, the space of time between the moments of the internal contacts, observed to a second of time, that is, to $\frac{1}{15}$ of a second, or 4‴ of an arch, may be obtained by the assistance of a moderate telescope and a pendulum clock, that is consistent with itself exactly for 6 or 8 hours. Now from two such observations rightly made in proper places, the distance of the sun within a 500th part may be certainly concluded, &c. See Parallax.

Transit instrument, in astronomy, is a telescope fixed at right angles to a horizontal axis; this axis being so supported that the line of collimation may move in the plane of the meridian.

The axis, to the middle of which the telescope is fixed, should gradually taper toward its ends, and terminate in cylinders well turned and smoothed; and a proper weight or balance is put on the tube, so that it may stand at any elevation when the axis rests on the supporters. Two upright posts of wood or stone, firmly fixed at a proper distance, are to sustain the supporters to this instrument; these supporters are two thick brass plates, having well smoothed angular notches in their upper ends, to receive the cylindrical arms of the axis; each of the notched plates is contrived to be moveable by a screw, which slides them upon the surfaces of two other plates immoveably fixed to the two upright posts: one plate moving in a vertical direction, and the other horizontally, they adjust the telescope to the planes of the horizon and meridian; to the plane of the horizon, by a spirit level hung in a position parallel to the axis, and to the plane of the meridian, in the following manner. Observe the times, by the clock, when a circumpolar star, seen through this instrument, transits both above and below the pole; then if the times of describing the eastern and western parts of its circuit be equal, the telescope is then in the plane of the meridian; otherwise the notched plates must be gently moved till the time of the star's revolution is bisected by both the upper and lower transits, taking care at the same time that the axis keeps its horizontal position.

When the telescope is thus adjusted, a mark must be set up, or made, at a considerable distance (the greater the better) in the horizontal direction of the intersection of the cross wires, and in a place where it can be illuminated in the night-time by a lanthorn near it, which mark, being on a fixed object, will serve at all times afterwards to examine the position of the telescope, by first adjusting the transverse axis by the level.

To adjust a clock by the sun's transit over the meridian, note the times by the clock, when the preceding and following edges of the sun's limb touch the cross wires: the difference between the middle time and 12 hours, shews how much the mean, or clock time, is faster and slower than the apparent or solar time, for that day; to which the equation of time being applied, it will shew the time of mean noon for that day, by which the clock may be adjusted.

TRANSI′TION. *s.* (*transitio*, Latin.) 1. Removal; passage from one to another (*Woodward*). 2. Change; mode of change (*Pope*). 3. Passage in writing or conversation from one subject to another (*Dryden*).

TRA′NSITIVE. *a.* (*transitivus*, Latin.) 1. Having the power of passing (*Bacon*). 2. (In grammar.) A verb *transitive* is that which signifies an action, conceived as having an effect upon some object: as, *I strike the earth* (*Clarke*).

TRA′NSITORILY. *ad.* (from *transitory*.) With speedy evanescence; with short continuance.

TRA′NSITORINESS. *s.* (from *transitory*.) Speedy evanescence.

TRA′NSITORY. *a.* (*transitorius*, from *transeo*, Latin.) Continuing but a short time; speedily vanishing (*Tillotson*).

To TRANSLA′TE. *v. n.* (*translatus*, Lat.) 1. To transport; to remove (*Hebrews*). 2. It is particularly used of the removal of a bishop from one see to another (*Camden*). 3. To transfer from one to another; to convey (*Peacham*). 4. To change (*Shakspeare*). 5. (*translater*, old Fr.) To interpret in another language (*Luke*). 6. To explain (*Shaks.*).

TRANSLA′TION. *s.* (*translatio*, Latin; *translation*, French.) 1. Removal; act of removing (*Arbuthnot*). 2. The removal of a bishop to another see (*Clarendon*). 3. The act of turning into another language; interpretation (*Denham*). 4. Something made by translation; version (*Hooker*).

Translation is used for the version of a book or writing out of one language into another. The principles of translation have been clearly and accurately laid down by Dr. Campbell of Aberdeen, in his invaluable Preliminary Dissertations to his excellent translations of the gospels. The fundamental rules which he establishes are three: 1. That the translation should give a complete transcript of the ideas of the original. 2. That the style and manner of the original should be preserved in the translation. 3. That the translation should have all the ease of original composition. The rules deducible from these general laws are explained and illustrated with much judgment and taste, in a late Essay on the Principles of Translation, by Mr. Tytler, judge-advocate of Scotland. There are also 15 excellent rules for the guidance of translators, in the preface to archbishop Newcome's improved version of the minor prophets.

There have been various translations of the Bible into the English language: but of which, however interesting it would be, we cannot here give the history. The present authorised version was effected in the reign of king James I.: the names of the persons employed upon it, and the rules they were to observe, we insert below, as matters of great curiosity.

WESTMINSTER.

Mr. Dean of Westmin.	Pentateucheon; and the story from Joshua to the 1st book of Chronicles exclusive.
Mr. Dean of St. Paul's,	
Dr. Saravia,	
Dr. Clark,	
Mr. Leifield,	
Dr. Teigh,	
Mr. Burleigh,	
Mr. King,	
Mr. Thompson,	
Mr. Beadwell.	

CAMBRIDGE.

Mr. Lively,	From the 1st book of Chronicles, with the rest of the story, and the Hagiographi, viz. Job, Psalms, Proverbs, Canticles, Ecclesiastes.
Mr. Richardson,	
Mr. Chatterton,	
Mr. Dillingham,	
Mr. Harrison,	
Mr. Andrews,	
Mr. Spalding,	
Mr. Burge.	

OXFORD.

Dr. Harding,	The four or greater Prophets, with the Lamentations, and the twelve lesser Prophets.
Dr. Reynolds,	
Dr. Holland,	
Dr. Kilbye,	
Mr. Smith,	
Mr. Brett,	
Mr. Fairclough.	

CAMBRIDGE.

Dr. Dewport,	The Prayer of Manasses, and the rest of the Apocrypha.
Dr. Braithwait,	
Dr. Radcliffe,	
Mr. Ward, Eman.	
Mr. Downes,	
Mr. Boyes,	
Mr. Warde, Reg.	

OXFORD.

Dean of Christchurch,	The four Gospels, Acts of the Apostles, and Apocalypse.
Dean of Winchester,	
Dean of Worcester,	
Dean of Windsor,	
Mr. Savile,	
Dr. Perne,	
Dr. Ravens,	
Mr. Haviner.	

WESTMINSTER.

Dean of Chester,	The Epistles of St. Paul. The Canonical Epistles.
Dr. Hutchinson,	
Dr. Spencer,	
Mr. Fenton,	
Mr. Rabbet,	
Mr. Sanderson,	
Mr. Dakins.	

The following are the rules they were required to observe.

1. The ordinary bible read in the church, commonly called the bishop's bible, to be followed, and as little altered as the truth of the original will permit.

2. The names of the prophets and the holy writers, with the other names of the text, to be retained as nigh as may be, according as they were vulgarly used.

3. The old ecclesiastical words to be kept, viz. the word *church* not to be translated *congregation*, &c.

4. When a word hath divers significations, that to be kept which hath been most commonly used by most of the ancient fathers, being agreeable to the propriety of the place and the analogy of faith.

5. The division of the chapters to be altered, either not at all, or as little as may be, if necessity so require.

6. No marginal notes at all to be affixed but only for the explanation of the Hebrew or Greek words; which cannot, without some circumlocution, so briefly and fitly be expressed in the text.

7. Such quotations of places to be marginally set down, as shall serve for the reference of one scripture to another.

8. Every particular man of each company to take the same chapter or chapters, and having translated or amended them severally by himself where he thinketh good, all to meet together, confer what they have done, and agree for their parts what shall stand.

9. As any one company hath dispatched any one book in this manner, they shall send it to the rest, to be considered of seriously and judiciously: for his majesty is very careful in this point.

10. If any company, upon the review of the book so sent, doubt or differ upon any place, to send them word thereof, note the place, and withal send the reasons; to which if they consent not, the difference to be compounded at the general meeting, which is to be of the chief person of each company at the end of the work.

11. When any place of special obscurity is doubted of, letters to be directed, by authority, to send to any learned man in the land, for his judgment of such a place.

12. Letters to be sent from every bishop to the rest of his clergy, admonishing them of this translation in hand, and to move and charge as many as being skilful in the tongues, and having taken pains in that kind, to send his particular observations to the company, either at Westminster, Cambridge, or Oxford.

13. The directors in each company to be the deans of Westminster and Chester for that place; and the king's professors in the Hebrew or Greek, in either university.

14. These translations to be used when they agree better with the text than the bishop's bible: viz. Tindall's, Matthews's, Coverdale's, Whitchurch, Geneva.

15. Besides the said directors before-mentioned, three or four of the most ancient and grave divines, in either of the universities, not employed in translating, to be assigned by the vice-chancellor, upon conference with the rest of the heads, to be overseers of the translations, as well Hebrew as Greek, for the better observation of the fourth rule above specified.

TRANSLA'TIVE. *a.* (*translativus*, Latin.) Taken from others.

TRANSLA'TOR. *s.* (from *translate.*) One that turns any thing into another language (*Denham*).

TRANSLA'TORY. *a.* (from *translate.*) Transferring (*Arbuthnot*).

TRANSLOCA'TION. *s.* (*trans* and *locus*, Latin.) Removal of things reciprocally to each other's places (*Woodward*).

TRANSLU'CENCY. *s.* (from *translucent.*) Diaphaneity; transparency (*Boyle*).

TRANSLU'CENT. TRANSLU'CID. *a.* (*trans* and *lucens* or *lucidus*, Lat.) Transparent; diaphanous; clear (*Bacon. Pope*).

TRA'NSMARINE. *a.* (*transmarinus*, Lat.) Lying on the other side of the sea; found beyond sea (*Howel*).

To TRA'NSMEW. *v. a.* (*transmeur*, Fr.) To transmute; to transform; to metamorphose; to change: obsolete (*Spenser*).

TRA'NSMIGRANT. *a.* (*transmigrans*, Lat.) Passing into another country or state.

To TRA'NSMIGRATE. *v. n.* (*transmigro*, Latin.) To pass from one place or country into another (*Dryden*).

TRANSMIGRA'TION. *s.* (from *transmigrate.*) Passage from one place or state into another (*Denham*).

TRANSMI'SSION. *s.* (*transmission*, Fr.; *transmissus*, Latin.) The act of sending from one place or person to another (*Newton*).

TRANSMISSION, in optics, &c. denotes the property of a transparent body, by which it suffers the rays of light to pass through its substance; in which sense the word stands opposed to reflection.

Transmission is also frequently used in the same sense with refraction; because most bodies, in transmitting the rays, do also refract them.

TRANSMI'SSIVE. *a.* (from *transmissus*, Lat.) Transmitted; derived from one to another (*Glanville*).

To TRANSMI'T. *v. a.* (*transmitto*, Lat.) To send from one place to another (*Hale*).

TRANSMI'TTAL. *s.* (from *transmit.*) The act of transmitting; transmission (*Swift*).

TRANSMI'TTER. *s.* (from *transmit.*) One that transmits.

TRANSMU'TABLE. *a.* (*transmutable*, French; from *transmute.*) Capable of change; possible to be changed into another nature or substance (*Arbuthnot*).

TRANSMU'TABLY. *ad.* (from *transmute.*) With capacity of being changed into another substance or nature.

TRANSMUTA'TION. *s.* (*transmutation*, Fr.) Change into another nature or substance. The great aim of alchemy is the *transmutation* of base metals into gold (*Bentley*).

To TRANSMU'TE. *v. n.* (*transmuto*, Lat.) To change from one nature or substance to another (*Raleigh*).

TRANSMU'TER. *s.* (from *transmute.*) One that transmutes.

TRA'NSOM. *s.* (*transenna*, Latin.) 1. A thwart beam or lintel over a door. 2. (Among mathematicians.) The vane of an instrument called a cross-staff, being a piece of wood fixed across with a square socket upon which it slides (*Bailey*).

TRANSOMS, in a ship, certain beams or timbers extended across the sternpost of a ship, to fortify her afterpart, and give it the figure most suitable to the service for which she is calculated.

TRANSPARENCY, or TRANSLUCENCY, in physics, a quality in certain bodies, by which they give passage to the rays of light.

The transparency of natural bodies, as glass, water, air, &c. is ascribed by some, to the great number and size of the pores or interstices between the particles of those bodies. But this account is very defective; for the most solid and opaque body in nature, that we know of, contains a great deal more pores than it does matter; surely a great deal more than is necessary for the passage of so very fine and subtle a body as light.

Aristotle, Des Cartes, &c. make transparency to consist in straightness or rectilineal direction of the pores; by means of which, say they, the rays can make their way through, without striking against the solid parts, and so being reflected back again. But this account, Newton shews, is imperfect; the quantity of pores in all bodies being sufficient to transmit all the rays that fall upon them, however those pores be situated with respect to each other.

The reason then why all bodies are not transparent is not to be ascribed to their want of rectilineal pores; but either to the unequal density of the parts, or to the pores being filled with some foreign matters, or to their being quite empty, by means of which the rays, in passing through, undergoing a great variety of reflections and refractions, are perpetually diverted different ways, till at length falling on some of the solid parts of the body, they are extinguished and absorbed.

Thus cork, paper, wood, &c. are opaque; while glass, diamonds, &c. are transparent; and the reason is, that in the neighbourhood of parts equal in density with respect to each other, as these latter bodies, the attraction being equal on every side, no reflection or refraction ensues: but the rays which entered the first surface of the body proceed quite through it without interruption, those few only excepted that chance to meet with the solid parts: but in the neighbourhood of parts that differ much in density, such as the parts of wood and paper are, both in respect of themselves and of the air, or the empty space in their pores; as the attraction is very unequal, the reflections and refractions must be very great; and therefore the rays will not be able to make their way through such bodies, but will be variously deflected, and at length quite stopped. See OPACITY.

TRANSPA′RENT. *a.* (*transparent*, Fr.) Pervious to the light; clear; pellucid; diaphanous; translucent; not opaque (*Addison*).

TRANSPI′CUOUS. *a.* (*trans* and *specio*, Latin.) Transparent; pervious to the sight.

To TRANSPI′ERCE. *v. n.* (*transpercer*, French.) To penetrate; to make way through; to permeate (*Raleigh*).

TRANSPIRA′TION. *s.* (*transpiration*, French.) Emission in vapour (*Sharp*).

To TRANSPI′RE. *v. a.* (*transpiro*, Lat. *transpirer*, French.) To emit in vapour.

To TRANSPI′RE. *v. n.* (*transpirer*, French.) 1. To be emitted by insensible vapour (*Woodward*). 2. To escape from secrecy to notice.

To TRANSPLA′CE. *v. a.* (*trans* and *place*.) To remove; to put into a new place (*Wilkins*).

To TRANSPLA′NT. *v. a.* (*trans* and *planto*, Latin.) 1. To remove and plant in a new place (*Roscommon*). 2. To remove and settle (*Bacon*). 3. To remove (*Clarendon*).

TRANSPLANTA′TION. *s.* (*transplantation*, French.) 1. The act of transplanting or removing to another soil (*Suckling*). 2. Conveyance from one to another (*Baker*). 3. Removal of men from one country to another (*Broome*).

TRANSPLANTATION, in agriculture and gardening, the act of removing trees or plants from the places where they were sowed or raised, and planting them in others.

It was formerly conceived difficult, if not impossible, to remove old or full-grown trees: insomuch that the expression *veterem arborem transplantare*, "to transplant an old tree," became a proverb for any difficult enterprise; and Pliny was of opinion, that no tree should be attempted to be removed under two or above three years old.

Such transplantations, however, are now common, and may be successfully effected with due care and attention. Evelyn, for this purpose, advises that the earth should first be removed from about the tree; then to cut through all the side roots, till the tree may be, by force, brought down on one side, so that the tap-roots may be conveniently reached and cut off by the axe. The tree should then be redressed, and suffered to stand with the mould about it from which it was loosened, till the next year or longer; and by that time it will have shot new tender roots fit for transplanting, and may be taken up at a proper season. The following is another method. Before the hard frost sets in make a trench about the tree at such distance from the stem as you may judge sufficient for the root: dig so deep as almost to undermine it; place blocks and quarters of wood to sustain the earth, and cast in as much water as may fill the trench, or sufficiently wet it, unless the ground were very moist before. Let it thus stand till a hard frost bind it firmly to the roots, and then convey it to its new station, which may be preserved from freezing by placing warm litter in it. Then close the mould about the straggling fibres, and place the earth taken out of the pit about the root of the new-planted tree. Evelyn tells us that by some such means a grove of six hundred cocoa trees, of eighty years growth and sixty feet high to the lowest bough, were transplanted by count Maurice to his paradise of Freyburg; and that a person in Devonshire transplanted oaks as big as twelve oxen could draw, to supply a defect in an avenue. The same fact, indeed, has frequently occurred since. See GARDENING.

TRANSPLA′NTER. *s.* (from *transplant*.) One that transplants.

To TRANSPO′RT. *v. a.* (*trans* and *porto*, Latin; *transporter*, French.) 1. To convey by carriage from place to place (*Dryden*). 2. To carry into banishment as a felon (*Swift*). 3. To sentence as a felon to banishment. 4. To hurry by violence or passion (*Swift*). 5. To put into ecstacy; to ravish with pleasure (*Decay of Piety*).

TRA′NSPORT. *s.* (*transport*, French, from the verb.) 1. Transportation; carriage; conveyance (*Arbuthnot*). 2. A vessel of carriage; particularly a vessel in which soldiers are conveyed (*Dryden*). 3. Rapture; ecstacy (*South*).

TRANSPO′RTANCE. *s.* (from *transport*.) Conveyance; carriage; removal (*Shakspeare*).

TRANSPORTA′TION. *s.* (from *transport*.) 1. Removal; conveyance (*Wotton*). 2. Banishment for felony. 3. Ecstatic violence of passion (*South*).

Transportation is a kind of punishment, or more properly an alleviation or commutation of punishment, for criminals convicted of felony; who for the first offence, unless it is an extraordinary one, are generally transported to the plantations (at present to New South Wales), there to bear hard labour for a term of years; within which if they return, they are executed without further trial than identifying their persons.

A select committee of the House of Commons on the subject of transportation have delivered in an interesting report, which was ordered to be printed July 10, 1812. The whole of this report has been published in Nos. 1 and 2 of Dr. Thomson's Annals of Philosophy: we can only spare room for the two following tables.

TABLE I.

General Statement of the Inhabitants in his Majesty's Settlement on the Eastern Coast of New South Wales; with an Estimate of the Remains of Provisions in the Public Stores, 1*st March,* 1810.

	Civil Department victualled.			Military Deparment victualled.			Free Persons victualled.				Prisoners victualled from the Public Stores.			Number of different Rations.				Total Number of Persons victualled from the Stores.
	Men.	Women.	Children.	Men.	Women.	Children.	Men.	Women.	Children.	Orphans.	Men.	Women.	Children.	At Full.	At Two Thirds.	At Half.	At One Quarter.	
At Sydney	22	1	3	1281	203	369	141	121	20	11	792	63	87	2245	428	356	85	3114
At Paramatta..	8	-	-	85	14	40	32	47	79	3	243	65	12	371	126	108	23	628
At Hawkesbury	6	-	-	25	2	5	134	15	94	-	51	7	48	216	24	123	24	87
At Newcastle..	1	-	-	25	-	-	-	-	5	-	46	16	7	72	16	7	5	100
General Total .	37	1	3	1416	219	414	307	183	198	14	1132	151	154	2904	594	591	135	4229

Ration under issue:—Seven pounds of beef, or four pounds of pork.
Eleven and a half pounds of wheat.
Six ounces of sugar; or, in lieu thereof, one pound of wheat.

TABLE I. *continued.*

	People not victualled from the Public Stores.			Settlers not victualled from the Public Stores.			Total Number of Souls in the Settlement.	Week's Provisions in the Public Stores.				
	Men.	Women.	Children.	Men.	Women.	Total Number of Settlers not victualled.		Salted Beef.	Sated Pork.	Wheat and Rice as Flour.	Sugar.	
At Sydney	986	939	1012	98	9	107	6156	-	-	-	-	*
At Paramatta..........	381	298	306	187	7	194	1807	-	-	-	-	
At Hawkesbury........	539	407	620	430	6	436	2389	-	-	-	-	
At Newcastle..........	-	-	-	-	-	-	100	-	-	-	-	
General Total	1906	1644	1938	715	22	737	10,452	-	-	-	-	

Sydney, April 30, 1810.

(Signed) L. MACQUARIE,
Gov. in Chief, N. S. Wales.

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* These blanks are not filled up in the printed Report.

TABLE II.

General Statement of the Inhabitants in his Majesty's Settlements at Norfolk Island, Port Dalrymple, and Hobart Town, Van Diemen's Land, as accounted for by the respective Returns transmitted to Head Quarters.

			CIVIL DEPARTMENT VICTUALLED.																	MILITARY DEPARTMENT VICTUALLED.																
	Governor and Commander in Chief.	Lieutenant Governor.	Deputy Judge Advocate.	Commissary.	Principal Surgeon.	Deputy Provost Marshal.	Secretary to the Governor.	Clergymen.	Assistant Surgeons.	Surveyor of Lands.	Deputy Surveyor of Lands.	Deputy Commissaries.	Beach Master.	Overseers.	Superintendents and Storekeepers.	Women of the Civil Department.	Children above Two Years of Age.	Children under Two Years of Age.	Total of the Civil Department victualled.	Colonel.	Lieutenant Colonel.	Major.	Captains.	Lieutenants.	Ensigns.	Adjutant Paymaster and Quartermaster.	Surgeons.	Assistant Surgeons.	Serjeants and Corporals.	Drummers and Fifers.	Privates.	Women.	Children above Ten Years.	Children above Two Years.	Children under Two Years.	Total of the Military Department victualled.
At Norfolk Island......	-	-	-	-	-	1	-	-	1	-	-	-	1	-	3	-	-	-	6	-	-	-	-	1	-		-	-	4	2	28	7	-	5	-	47
Port Dalrymple........	-	1	-	-	-	-	-	-	1	-	1	1	-	-	2	4	2	-	12	-	-	-	1	1	1		-	-	8	2	48	17	-	39	-	117
Hobart Town	-	1	1	-	1	-	-	1	1	-	1	1	-	3	5	4	1	1	21	-	-	-	-	2	-		-	-	6	2	37	12	-	5	14	78
General Total.........	-	2	1	-	1	1	-	1	3	-	2	2	1	3	10	8	3	1	39	-	-	-	1	4	1	-	-	-	18	6	113	36	-	49	14	242

Date of the Returns:—Norfolk Island, March 31, 1810.—Port Dalrymple, Feb. 24, 1810.—Hobart Town, Jan. 31, 1810.

TABLE II. *continued.*

	Free Persons victualled.							Prisoners victualled from the Public Stores.						Number of different Rations.					Total Number of Persons victualled from the Stores.	People not victualled from the Public Stores.				Settlers not victualled from the Public Stores.			Total Number of Souls in the Settlement.	Week's Provisions in the Public Stores.		
	Men.	Women.	Children above Ten Years of Age.	Children above Two Years of Age.	Children under Two Years.	Orphans.	Total Number of Free Persons victualled.	Men.	Women.	Children above Ten Years.	Children above Two.	Children under Two Years.	Total Number of Persons victualled.	At Full.	At Two Thirds.	At Half.	At One Quarter.	Total Number of full Rations.		Men.	Women.	Children.	Total Number.	Men.	Women.	Total Number of Settlers.		Beef and Pork.	Wheat, Maize, and Rice, and Sugar as Wheat.	Sugar.
At Norfolk Island......	61	18	-	16	-	3	98	25	1	-	-	-	26	130	26	21	-	159	177	-	-	-	-	-	-	-	177	9¼	36	-
Port Dalrymple........	21	10	-	7	-	-	38	55	11	-	4	-	70	143	42	52	-	197	237	10	12	-	22	-	-	-	259	9½	39	27
Hobart Town	273	151	92	74	70	37	697	166	12	-	-	-	178	538	272	79	85	782	974	48	40	-	88	-	-	-	1062	13¼	7½	24
General Total	355	179	92	97	70	40	833	246	24	-	4	-	274	811	340	152	85	1138	1388	58	52	-	110	-	-	-	1498	-	-	-

Sydney, New South Wales, April 30, 1810.

(Signed) L. MACQUARIE,
Gov. in Chief, N. S. Wales.

TRANSPO'RTER. *s.* (from *transport.*) One that transports (*Carew*).

TRANSPO'SAL. *s.* (from *transpose.*) The act of putting things in each other's place.

To TRANSPO'SE. *v. a.* (*transposer*, Fr.) 1. To put each in the place of other (*Locke*). 2. To put out of place (*Shakspeare*).

TRANSPOSI'TION. *s.* (*transposition*, Fr.) 1. The act of putting one thing in the place of another. 2. The state of being put out of one place into another (*Woodward*).

Transposition, in algebra, is the bringing any term of an equation over to the other side of it. Thus, if $a+x=c$, and we make $x=c-a$, then a is said to be transposed. See Algebra.

To TRANSSHA'PE. *v. a.* (*trans* and *shape.*) To transform; to bring into another shape (*Shakspeare*).

To TRANSUBSTA'NTIATE. *v. a.* (*transubstantier*, French.) To change to another substance (*Milton*).

TRANSUBSTANTIA'TION. *s.* (*transubstantiation*, French.) A miraculous operation believed in the Roman church, in which the elements of the eucharist are supposed to be changed into the real body and blood of Christ (*Locke*).

TRANSUDA'TION. *s.* (from *transude.*) The act of passing in sweat or perspirable vapour, through any integument (*Boyle*).

To TRANSU'DE. *v. n.* (*trans* and *sudo*, Lat.) To pass through in vapour (*Harvey*).

TRANSVE'RSAL. *a.* (*transversal*, Fr.) Running crosswise (*Hale*).

TRANSVERSALIS ABDOMINIS. (*musculus transversalis.*) A muscle situated on the anterior part of the abdomen, which supports and compresses the abdominal viscera.

Transversalis anticus primus. See Rectus capitis lateralis.

Transversalis cervicis. See Longissimus dorsi.

Transversalis colli. A muscle situated on the posterior part of the neck, which turns the neck obliquely backwards, and a little to one side.

Transversalis dorsi. See Multifidus spinæ.

Transversalis major colli. See Longissimus dorsi.

Transversalis pedis. (*musculus transversalis pedis.*) A muscle of the foot, which it contracts by bringing the great toe and the two outermost toes nearer each other.

TRANSVE'RSALLY. *ad.* (from *transversal.*) In a cross direction (*Wilkins*).

To TRANSVE'RSE. *v. a.* (*transversus*, Latin.) To change; to overturn (*Lesley*).

Transve'rse. *a.* (*transversus*, Latin.) Being in a cross direction (*Blackmore*).

Transverse-axis, or diameter, in the conic sections, is the first or principal diameter or axis. See Axis, Diameter, and Conics.

Transverse suture. (*sutura transversalis.*) In anatomy, a suture that runs across the face, and sinks down into the orbits, joins the bones of the skull to the bones of the face; but with so many irregularities and interruptions, that the student will scarcely recognize it as a suture.

TRANSVE'RSELY. *ad.* (from *transverse.*) In a cross direction (*Stillingfleet*).

TRANSVERSO-SPINALES, in myology. See Multifidus spinæ.

TRANSVERSUS AURIS. (*musculus transversus auris.*) A muscle of the external ear, which draws the upper part of the concha towards the helix.

Transversus perinæi. (*musculus transversus perinœi.*) A muscle of the organs of generation, which sustains and keeps the perinæum in its proper place.

Transversus perinæi alter. Inferior prostate of Winslow. A small muscle occasionally found accompanying the former.

TRANSU'MPTION. *s.* (*trans* and *sumo*, Lat.) The act of taking from one place to another.

TRANSYLVANIA, a country formerly annexed to Hungary; bounded on the N. by Upper Hungary and Poland, on the E. by Moldavia and Walachia, on the S. by Walachia, and on the W. by Upper and Lower Hungary. It is 162 miles long and 150 broad, and surrounded on all parts by high mountains, which, however, are not barren. It produces as much corn and wine as is wanted, and there are rich mines of gold, silver, lead, copper, quicksilver, and alum. It has undergone various revolutions, but now belongs to the house of Austria. The inhabitants are of various religions, as Roman Catholics, Lutherans, Calvinists, Socinians, Arminians, Greeks, and Mahometans. The government is conducted by 12 persons: namely, three Roman Catholics, three Lutherans, three Calvinists, and three Socinians. Hermanstadt is the capital.

TRANTERS. *s.* Men who carry fish from the seacoasts to sell in the inland countries.

TRAON, or Trau, a strong town of Venetian Dalmatia, with a bishop's see. It is seated on the gulf of Venice, in a small island, joined to the mainland by a long bridge of wood, and to the isle of Bua by another of stone, 27 miles S.E. of Sebenico. Lon. 17. 52 E. Lat. 44. 0 N.

TRAP. *s.* (ꞇꞃappe, Saxon; *trape*, Fr. *trappola*, Ital.) 1. A snare set for thieves or vermin (*Taylor*). 2. An ambush; a stratagem to betray or catch unawares (*Calamy*). 3. A play at which a ball is driven with a stick (*King*).

To Trap. *v. a.* (ꞇꞃappan, Saxon.) 1. To ensnare; to catch by a snare or ambush; to take by stratagem (*Dryden*). 2. (See Trappings.) To adorn; to decorate (*Spenser*).

Trap, in mineralogy, a Swedish term signifying stair. See Basaltes. It was first applied to designate a certain class of mountains, composed of nearly horizontal strata, with perpendicular breaks, which were supposed to give a rude resemblance to a flight of stairs. Hence many species of rock, differing very much from each other, were called by the same name, which caused much confusion. According to Werner, there are three distinct classes or formations of rocks to which the term trap may be applied: of these the first class belongs to the primitive mountains, the second to the transition mountains, and the third to the secondary mountains. Primitive traps are composed essentially of hornblende, mingled with felspar, and sometimes with pyrites and mica. Of rocks belonging to this formation there are four distinct species, viz. the common hornblende, the schistose hornblende, primitive grünstein, and schistose grünstein. Transition traps are composed principally of granular grünstein, but the mixture of the ingredients is more intimate, the grain is finer, and the mass appears more homogeneous. There are two principal varieties, viz. 1. The amygdaloid, which is a rock of schistose hornblende in a state of semi-decomposition resembling fine ferruginous clay. It contains a number of globular cavities, from the size of a pea to that of a small apple: of these cavities some contain nothing but air, and are coated on the inside with a kind of varnish; others contain balls of calcareous spar, quartz, chalcedony, &c. The toadstone of Derbyshire is considered by Werner as belonging to this variety. 2. Globular trap, composed of schistose grünstein, in a state of semi-decomposition, arranged in spheroids of various magnitudes, and composed of thick concentric lamellar distinct concretions. Secondary or floetz traps are divided into those which are peculiar and characteristic of it, and those which are accidental. The former are basalt, porphyry, &c. Among the latter may be classed rubble and sandstone, clay, coal, and bituminous wood. The proper base to the secondary trap formation, or in other words the substance, which appears to have immediately preceded it in the order of formation, is secondary limestone; it is, however, not unfrequently found resting on sandstone, on argillite, on gneiss, and even on granite. The general order in which the strata of this formation are found is the following, viz. coarse sand, fine sand, sandy clay, unctuous clay, wakke, basalt, amygdaloid, porphyry, and grünstein. It hardly ever happens that all these strata are met with in the same mass of mountain. No metallic veins are found in this class of mountains, but the remains of vegetable and marine organized bodies are of frequent occurrence. See Rock.

TRAPA. Caltrop. In botany, a genus of the class tetrandria, order monogynia. Corol four-petalled; calyx four-parted; nut invested with opposite spines which were the leaves of the calyx. Two species.

1. T. natans. Water-caltrop. Nut four horns; the spines spreading. An aquatic plant; formerly employed in medicine under the name of tribulus aquaticus, and yielding what was known by the term nux aquatica. A native of Europe and Asia.

2. T. bicornis. Nuts two-horned, the horns obtuse, recurved. Likewise an aquatic plant. It is a native of China.

TRAPANI, or Trapano, a seaport on the W. side of Sicily, in Val di Mazara, with a fort, and an excellent harbour, in the form of a sickle, whence its ancient name Drepanum. It contains 20,000 inhabitants, and is a trading place, famous for its salt-works, and fisheries of tunnies and coral. It is seated on a small peninsula, 20 miles N. of Mazara, and 45 W. of Palermo. Lon. 12. 20 E. Lat. 38. 10 N.

TRAPDO'OR. *s.* (*trap* and *door.*) A door opening and shutting unexpectedly (*Ray*).

To TRAPE. *v. a.* (commonly written *to traipse.*) To run idly and sluttishly about. It is used only of women.

TRAPES. *s.* (Johnson supposes from *trape.*) An idle slatternly woman (*Gay*).

TREBATIUS TESTAS (C.), a man banished by Julius Cæsar, for following the interest of Pompey, and recalled by the eloquence of Cicero. He was afterwards reconciled to Cæsar. Trebatius was not less distinguished for his learning than for his integrity, his military experience, and knowledge of law. He wrote nine books on religious ceremonies, and treatises on civil law; and the verses that he composed proved him a poet of no inferior consequence.

TRAPEZIFORM LEAF, in botany, a leaf having the shape of a trapezium, or plane figure with four unequal sides.

TRAPEZIUM OS, in anatomy. (τραπεζιον, a four-sided figure; so called from its shape.) The first bone of the second row of the carpus.

Trapezium, in geometry, a plane figure contained under four unequal right lines. 1. Any three sides of a trapezium taken together, are greater than the fourth. 2. The two diagonals of any trapezium divide it into four proportional triangles. 3. If two sides of a trapezium be parallel, the rectangle under the aggregate of the parallel sides and one-half their distance is equal to that trapezium. 4. If a parallelogram circumscribes a trapezium, so that one of the sides of the parallelogram be parallel to a diagonal of the trapezium, that parallelogram will be the double of the trapezium. 5. If any trapezium has two of its opposite angles, each a right angle, and a diagonal be drawn joining these angles; and if from the other two angles be drawn two perpendiculars to that diagonal, the distances from the feet of these perpendiculars to those right angles, respectively taken, will be equal. 6. If the sides of a trapezium be each bisected, and the points of bisection be joined by four right lines, these lines will form a parallelogram, which will be one half of the trapezium. 7. If the diagonals of a trapezium be bisected, and a right line joins these points, the aggregate of the squares of the sides is equal to the aggregate of the squares of the diagonals, together with four times of the square of the right line joining the point of bisection. 8. In any trapezium the aggregate of the diagonals is less than the aggregate of four right lines drawn from any point (except the intersection of the diagonals) within the figure.

TRAPEZIUS. (from τραπεζιος, four-square; so named from its shape.) In myology. Cucullaris. A muscle situated immediately under the integuments of the posterior part of the neck and back. It arises, by a thick, round, and short tendon, from the lower part of a protuberance in the middle of the occipital bone backwards, and from the rough line that is extended from thence towards the mastoid process of the os temporis, and by a thin membranous tendon, which covers part of the complexus and splenius. It then runs downwards along the nape of the neck, and rises tendinous from the spinous processes of the two lowermost vertebræ of the neck, and from the spinous processes of all the vertebræ of the back, being inseparably united to its fellow, the whole length of its origin, by tendinous fibres, which, in the nape of the neck, form what is called ligamentum colli, or the cervical ligament. It is inserted fleshy into the broad and posterior half of the clavicle, tendinous and fleshy into one half of the acromion, and into almost all the spine of the scapula.

This muscle serves to move the scapula in different directions. Its upper descending fibres pull it obliquely upwards; its middle transverse ones pull it directly backwards; its inferior fibres, which ascend obliquely upwards, draw it obliquely downwards and backwards.

The upper part of the muscle acts upon the neck and head, the latter of which it draws backwards, and turns upon its axis. It likewise concurs with other muscles in counteracting the flexion of the head forwards.

TRAPEZOID. (τραπεζιον and ειδος.) In geometry, a quadrilateral figure in which two of the sides are parallel.

Trapezoides os. The second bone of the second row of the carpus; so called from its resemblance to the trapezium or quadrilateral geometrical figure.

TRAPP (Joseph), an ingenious English divine, was born at Cherington, in Gloucestershire, in 1672, and educated at Wadham-college, Oxford, where he took his degrees in arts. He first published Prælectiones Poeticæ, in which he shewed himself an excellent critic and latinist. He translated Milton's Paradise Lost into Latin, but with little success; and Virgil's Works, into English blank verse, with less. He published four volumes of Sermons, and was author of a tragedy, called Abramule; or, Love an Empire, acted in 1704. He died in 1747.

TRAPPE, a once celebrated monastery of France, in the department of Orne, situate in a large valley, surrounded by mountains. The monks were famous for their austerity, and keeping perpetual silence.

TRA'PPINGS. *s.* (*drap*, French, *cloth.*) 1. Ornaments appendant to the saddle (*Milton*). 2. Ornaments; dress; embellishments (*Shakspeare*).

TRARBACH, a town of Germany, in the palatinate of Lower Rhine, and county of Spanheim, seated on the Moselle. Its fortress, which is on a mountain, and commands the passage of the Moselle, was taken by the French in 1794. It is 22 miles N.E. of Treves, and 28 S.W. of Coblentz. Lon. 7. 7 E. Lat. 49. 55 N.

TRASH. *s.* (*tros*, Islandic; *drusen*, Germ.) 1. Any thing worthless; dross; dregs (*Swift*). 2. A worthless person (*Shakspeare*). 3. Matter improper for food (*Garth*).

To Trash. *v. a.* 1. To lop; to crop (*Sh.*). 2. To crush; to humble (*Hammond*).

TRA'SHY. *a.* (from *trash.*) Worthless; vile; useless (*Dryden*).

TRASS. See Terras or Cæmentum.

To TRA'VAIL. *v. n.* (*travailler*, French.) 1. To labour; to toil. 2. To be in labour; to suffer the pains of childbirth (*Isaiah*).

To Tra'vail. *v. a.* To harass; to tire (*Hayward*).

Tra'vail. *s.* (from the verb.) 1. Labour; toil; fatigue (*Hooker*). 2. Labour in childbirth (*Bacon*).

TRAVANCORE, a province of Hindustan, extending along the coast of Malabar from Cape Comorin to 10. 15 N. lat. and bounded on the N. by Mysore, and on the E. by the Carnatic. It is subject to a rajah, who is an ally of the English East India Company, and in defence of whom they engaged, in conjunction with the Mahrattas and the nizam of the Deccan, in the war against Tippoo Sultan. See Cranganore.

Travancore, the capital of a province of the same name, in the peninsula of Hindustan, 100 miles S.S.E. of Cochin. Lon. 77. 8 E. Lat. 8. 15 N.

TRAVE, a river of Germany, in the duchy of Holstein, which runs from W. to E. and passing by Segeberg, Oldeslo, and Lubec, falls into the Baltic, at Travemunde.

Trave, Tra'vel, or Tra'vise. *s.* A wooden frame for shoeing unruly horses.

To TRA'VEL. *v. n.* 1. To make journeys (*Dryden*). 2. To pass; to go; to move (*Pope*). 3. To make journeys of curiosity (*Watts*). 4. To labour; to toil. This should be rather *travail* (*Hooker*).

To Tra'vel. *v. a.* 1. To pass; to journey over (*Milton*). 2. To force to journey (*Spenser*).

Tra'vel. *s.* (*travail*, French.) 1. Journey; act of passing from place to place (*Prior*). 2. Journey of curiosity or instruction (*Bacon*). 3. Labour; toil. This should be rather *travail* (*Milton*). 4. Labour in childbirth. This sense belongs rather to *travail* (*Dryden*). 5. Travels. Account of occurrences and observations of a journey into foreign parts (*Watts*).

TRA'VELLER. *s.* (*travailleur*, French.) 1. One who goes a journey; a wayfarer (*Sp.*). 2. One who visits foreign countries (*Locke*).

Traveller's joy, in botany. See Clematis.

TRAVEMUNDE, a strong town of Germany, in the duchy of Holstein, seated at the mouth of the Trave. It is the port of Lubec, to which it belongs, and is 12 miles N.E. of that city. Lon. 10. 55 E. Lat. 54. 1 N.

TRAVERS, a town of Swisserland, in the county of Neuchatel, 11 miles W. of Neuchatel. Lon. 6. 50 E. Lat. 47. 6 N.

TRA′VERS. *ad.* (Fr.) Athwart; across: not used (*Shakspeare*).

TRA′VERSE. *ad.* (*a travers*, Fr.) Crosswise; athwart (*Hayward*).

TRA′VERSE. *prep.* Through; crosswise (*Milton*).

TRA′VERSE. *a.* (*transversus*, Lat. *traverse*, French.) Lying across; lying athwart (*Wotton*).

TRA′VERSE. *s.* 1. Any thing laid or built across (*Bacon*). 2. Something that thwarts, crosses, or obstructs; cross accident; thwarting obstacle (*Dryden*).

To TRA′VERSE. *v. a.* (*traverser*, French.) 1. To cross; to lay athwart (*Shakspeare*). 2. To cross by way of opposition; to thwart with obstacles (*Arbuthnot*). 3. To oppose; to cross by an objection. A law term (*Baker*). 4. To wander over; to cross (*Milton*). 5. To survey; to examine thoroughly (*South*).

To TRA′VERSE. *v. n.* To use a posture of opposition in fencing (*Shakspeare*).

TRAVERSE, or TRANSVERSE, in general, denotes something that goes athwart another; that is, crosses and cuts it obliquely.

Hence, to traverse a piece of ordnance, among gunners, signifies to turn or point it which way one pleases, upon the platform.

In fortification, traverse denotes a trench with a little parapet, or bank of earth, thrown perpendicularly across the moat, or other work, to prevent the enemy's cannon from raking it. These traverses may be from twelve to eighteen feet, in order to be cannon-proof; and their height about six or seven feet, or more if the place is exposed to any eminence. And to preserve a communication, a passage of about five or six feet wide must be left at one end of the traverse. If any part of a work, thus shut in by one or more traverses, is likely to be defended by the musketry, it will be proper to add to the traverses one or more footbanks within the defence, for the troops to mount on when they want to fire over the traverse.

TRAVERSE SAILING. See NAVIGATION.

TRAVERSE, in law, signifies sometimes to deny, sometimes to overthrow or undo a thing, or to put one to prove some matter; much used in answers to bills in chancery: or it is that which the defendant pleads or says in bar to avoid the plaintiff's bill, either by confessing and avoiding, or by denying and traversing the material parts thereof.

TRAVERSE AN INDICTMENT, is to take issue upon the chief matter, and to contradict or deny some point of it. A traverse must be always made to the substantial part of the title. Where an act may indifferently be intended to be at one day or another, there the day is not traversable. In an action of trespass generally, the day is not material; though if a matter is done upon a particular day, there it is material and traversable. 2 Roll's Rep. 37.

TRAVESTY, or TRAVESTI, a French term, derived from the verb *travestir*, to disguise one's self, or to appear in masquerade: a name given to a humorous translation of any author.

TRAVIS (George), an English divine, was born at Royton, in Lancashire, and educated at Manchester school, from whence he proceeded to St. John's college, Cambridge, where he took his degrees in arts. On entering into orders he obtained the vicarage of Eastham, and the rectory of Handley, in Cheshire, and also the archdeaconry of Chester, and a prebend in that cathedral. He distinguished himself by some acute letters to Mr. Gibbon, in which he strenuously maintained the genuineness of the much controverted passage in St John's first epistle, chap. 1. v. vii. He died in 1797. (*Watkins*).

TRAUMA. (τραυμα.) In medicine, a wound.

TRAUMATIC. (*medicamenta traumatica.*) Having a power to heal wounds; vulnerary.

TRAUTENAU, a town of Bohemia, in the circle of Konigsgratz, 21 miles N. of Konigsgratz. Lon. 16. 10 E. Lat. 50. 45 N.

TRAY. *s.* (*tray*, Swedish.) A shallow wooden vessel in which meat or fish is carried (*Gay*).

TRAYGUERA, a town of Spain, in Valencia, 30 miles S. of Tortosa. Lon. 0. 30 E. Lat. 40. 26 N.

TRA′YTRIP. *s.* A kind of play (*Shakspeare*).

TREA′CHEROUS. *a.* (from *treachery.*) Faithless; perfidious; guilty of deserting or betraying (*Swift*).

TRE′ACHEROUSLY. *ad.* Faithlessly; perfidiously; by treason; by dishonest stratagem (*Otway*).

TRE′ACHEROUSNESS. *s.* (from *treacherous.*) The quality of being treacherous; perfidiousness.

TRE′ACHERY. *s.* (*trichere*, Fr.) Perfidy; breach of faith.

TRE′ACHETOR. TRE′ACHOUR. *s.* (from *tricher*, *tricheur*, Fr.) A traitor; one who betrays; one who violates his faith or allegiance: not in use (*Spenser*).

TREACLE. See MELASSES.

TREACLE BEER. See SPRUCE.

TREACLE MUSTARD. See CLYPEOLA.

To TREAD. *v. n.* preterit *trod*; part. pass. *trodden.* (*trudan*, Gothic; ꞇꞃeꝺan, Saxon; *treden*, Dutch.) 1. To set the foot (*Milton*). 2. To trample; to set the feet in scorn or malice (*Shakspeare*). 3. To walk with form or state (*Milton*). 4. To copulate as birds (*Bacon*).

To TREAD. *v. a.* 1. To walk on; to feel under the foot (*Prior*). 2. To press under the foot (*Swift*). 3. To beat; to track (*Sh.*). 4. To walk on in a formal or stately manner.

5. To crush under foot; to trample in contempt or hatred (*Psalms*). 6. To put in action by the feet (*Job*). 7. To love as the male bird the female (*Dryden*).

Tread. *s.* (from the verb.) 1. Footing; step with the foot (*Milton*). 2. Way; track; path (*Shakspeare*). 3. The cock's part in the egg.

Tread of a horse. This is reckoned good, if firm, and without his resting upon one side of the foot more than upon the other, or setting down the toe or heel one before the other. If he sets his heels first to the ground, then it is a sign that he is unsound in his feet. If he sets his toes first to the ground, it shews that he has been a draught-horse. Therefore in a good saddle-horse the whole foot should be set down equally, at the same instant of time, and turned neither out nor in.

Tread upon the coronet. See Crapaudine.

TREA'DER. *s.* (from *tread.*) He who treads (*Isaiah*).

TRE'ADLE. *s.* (from *tread.*) 1. A part of an engine on which the feet act to put it in motion (*Moxon*). 2. The sperm of the cock (*Derham*).

TREASON, a general appellation, made use of by the law, to denote not only offences against the king and government, but also that accumulation of guilt which arises whenever a superior reposes a confidence in a subject or inferior, between whom and himself there subsists a natural, a civil, or even a spiritual relation; and the inferior so abuses that confidence, so forgets the obligations of duty, subjection and allegiance, as to destroy the life of any such superior or lord. Hence treason is of two kinds, *high* and *petty*.

High-Treason, or *Treason Paramount* (which is equivalent to the *crimen læsæ majestatis* of the Romans, as Glanvil denominates it also in our English law), is an offence committed against the security of the king or kingdom, whether by imagination, word, or deed. In order to prevent the inconveniencies which arose in England from a multitude of constructive treasons, the statute 25 Edw. III. c. 2. was made; which defines what offences only for the future should be held to be treason; and this statute comprehends all kinds of high-treason under seven distinct branches.

"1. When a man doth compass or imagine the death of our lord the king, of our lady his queen, or of their eldest son and heir." Under this description it is held that a queen-regnant (such as queen Elizabeth and queen Anne) is within the words of the act, being invested with royal power, and intitled to the allegiance of her subject: but the husband of such a queen is not comprised within these words; and therefore no treason can be committed against him.

Let us next see what is a compassing or imagining the death of the king, &c. These are synonymous terms: the word compass signifying the purpose or design of the mind or will; and not, as in common speech, the carrying such design to effect. And therefore an accidental stroke, which may mortally wound the sovereign, *per infortuniam*, without any traitorous intent, is no treason: as was the case of sir Walter Tyrrel, who, by the command of king William Rufus, shooting at a hart, the arrow glanced against a tree, and killed the king upon the spot. But as this compassing or imagination is an act of the mind, it cannot possibly fall under any judicial cognizance, unless it be demonstrated by some open or overt act. The statute expressly requires, that the accused "be thereof upon sufficient proof attainted of some open act by men of his own condition." Thus, to provide weapons or ammunition for the purpose of killing the king, is held to be a palpable overt act of treason in imagining his death. To conspire to imprison the king by force, and move towards it by assembling company, is an overt act of compassing the king's death; for all force, used to the person of the king, in its consequence may tend to his death, and is a strong presumption of something worse intended than the present force, by such as have so far thrown off their bounden duty to their sovereign: it being an old observation, that there is generally but a short interval between the prisons and the graves of princes. It seems clearly to be agreed, that by the common law and the statute of Edw. III. words spoken amount only to a high misdemeanor, and no treason. For they may be spoken in heat, without any intention; or be mistaken, perverted, or misremembered by the hearers; their meaning depends always on their connection with other words and things; they may signify differently even according to the tone of voice with which they are delivered; and sometimes silence itself is more expressive than any discourse. As therefore there can be nothing more equivocal and ambiguous than words, it would indeed be unreasonable to make them amount to high treason. And accordingly, in 4 Car. I. on a reference to all the judges, concerning some very atrocious words spoken by one Pyne, they certified to the king, "that though the words were as wicked as might be, yet they were no treason; for unless it be by some particular statute, no words will be treason." If the words be set down in writing, it argues more deliberate intention; and it has been held, that writing is an overt act of treason; for *scribere est agere*. But even in this case the bare words are not the treason, but the deliberate act of writing them.

2. The second species of treason is, "if a man do violate the king's companion, or the king's eldest daughter unmarried, or the wife of the king's eldest son and heir." By the king's companion is meant his wife; and by violation is understood carnal knowledge, as well without force as with it; and this is high treason in both parties if both be consenting: as some of the wives of Henry VIII. by fatal experience evinced.

3. The third species of treason is, "if a man do levy war against our lord the king in

his realm." And this may be done by taking arms, not only to dethrone the king, but under pretence to reform religion, or the laws, or to remove evil counsellors, or other grievances whether real or pretended. For the law does not, neither can it, permit any private man, or set of men, to interfere forcibly in matters of such importance; especially as it has established a sufficient power for these purposes in the high court of parliament: neither does the constitution justify any private or particular resistance for private or particular grievances; though, in cases of national oppression, the nation has very justifiably risen as one man, to vindicate the original contract subsisting between the king and his people.

4. "If a man be adherent to the king's enemies in his realm, giving to them aid and comfort in the realm or elsewhere," he is also declared guilty of high-treason. This must likewise be proved by some overt act; as by giving them intelligence, by sending them provisions, by selling them arms, by treacherously surrendering a fortress, or the like.

5. "If a man counterfeit the king's great or privy seal," this is also high-treason. But if a man takes wax bearing the impression of the great seal off from one patent and fixes it to another, this is held to be only an abuse of the seal, and not a counterfeiting of it: as was the case of a certain chaplain, who in such a manner framed a dispensation for non-residence. But the knavish artifice of a lawyer much exceeded this of the divine. One of the clerks in chancery glued together two pieces of parchment; on the uppermost of which he wrote a patent, to which he regularly obtained the great seal, the label going through both the skins. He then dissolved the cement, and taking off the written patent, on the blank skin, wrote a fresh patent of a different import from the former, and published it as true. This was held no counterfeiting of the great seal, but only a great misprision; and sir Edward Coke mentions it with some indignation that the party was living at that day.

6. The sixth species of treason under this statute is, "if a man counterfeit the king's money; and if a man bring false money into the realm counterfeit to the money of England, knowing the money to be false, to merchandise and make payment withal." As to the first branch, counterfeiting the king's money; this is treason, whether the false money be uttered in payment or not. Also if the king's own minters alter the standard or alloy established by law, it is treason. But gold and silver money are only held to be within this statute. With regard likewise to the second branch, importing foreign counterfeit money in order to utter it here; it is held that uttering it, without importing it, is not within the statute.

7. The last species of treason ascertained by this statute is, "if a man slay the chancellor, treasurer, or the king's justices of the one bench or the other, justices in eyre, or justices of assize, and all other justices assigned to hear and determine, being in their places doing their offices." These high magistrates, as they represent the king's majesty during the execution of their offices, are therefore for the time equally regarded by the law. But this statute extends only to the actual killing of them; and not to wounding, or a bare attempt to kill them. It extends also only to the officers therein specified; and therefore the barons of the exchequer, as such, are not within the protection of this act; but the lord keeper or commissioners of the great seal now seem to be within it, by virtue of the statutes 5 Eliz. c. 18. and 1 Will. and M. c. 21.

The new treasons, created since the statute 1 M. c. 1. and not comprehended under the description of statute 25 Edw. III. may be comprised under three heads. The first species relates to papists; the second to falsifying the coin or other royal signatures, as falsely forging the sign manual, privy signet, or privy seal, which shall be deemed high-treason (1 M. stat. ii. c. 6.). The third new species of high-treason is such as was created for the security of the protestant succession in the house of Hanover. For this purpose, after the act of settlement was made, it was enacted by statute 13 and 14 W. III. c. 3. that the pretended prince of Wales, assuming the title of king James III. should be attainted of high-treason; and it was made high-treason for any of the king's subjects to hold correspondence with him or any person employed by him, or to remit money for his use. And by 17 Geo. II. c. 39. it is enacted, that if any of the sons of the Pretender shall land or attempt to land in this kingdom, or be found in the kingdom or any of its dominions, he shall be adjudged attainted of high treason; and corresponding with them, or remitting money to their use, is made high-treason. By 1 Ann. stat. 2. c. 17. the offence of hindering the next in succession from succeeding to the crown is high-treason: and by 6 Ann. c. 7. if any person shall maliciously, advisedly, and directly, by writing or printing, maintain, that any other person hath any right to the crown of this realm, otherwise than according to the act of settlement, or that the kings of this realm with the authority of parliament are not able to make laws to bind the crown and its descent; such person shall be guilty of high-treason.

The punishment of high-treason in general is very solemn and terrible. 1. That the offender be drawn to the gallows, and not be carrie or walk; though usually (by connivance, a length ripened by humanity into law) a sledg or hurdle is allowed, to preserve the offende from the extreme torment of being dragged or the ground or pavement 2. That he be hange by the neck, and then cut down alive. 3 That his entrails be taken out, and burne while he is yet alive. 4. That his head b cut off. 5. That his body be divided into fou parts. 6. That his head and quarters be a the king's disposal.

The king may, and often doth, discharge al the punishment except beheading, especiall where any of noble blood are attainted. For beheading being part of the judgment, that may be executed, though all the rest be omitted by the king's command. But where beheading is no part of the judgment, as in murder or other felonies, it hath been said that the king cannot change the judgment, although at the request of the party, from one species of death to another.

In the case of coining, which is a treason of a different complexion from the rest, the punishment is milder for male offenders: being only to be drawn and hanged by the neck till dead. But in treasons of every kind the punishment of women is the same, and different from that of men. For as the natural modesty of the sex forbids the exposing and publicly mangling their bodies, their sentence (which is to the full as terrible to sense as the other) is to be drawn to the gallows, and there to be burned alive.

For the consequences of this judgment, see Attainder, Forfeiture, and Corruption of Blood.

Petty or *Petit Treason*, according to the statute 25 Edward III. c. 2. may happen three ways: by a servant killing his master, a wife her husband, or an ecclesiastical person (either secular or regular) his superior, to whom he owes faith and obedience. A servant who kills his master whom he has left, upon a grudge conceived against him during his service, is guilty of petty treason: for the traitorous intention was hatched while the relation subsisted between them, and this is only an execution of that intention. So if a wife be divorced *a mense et thoro*, still the *vinculum matrimonii* subsists; and if she kills such divorced husband, she is a traitress. And a clergyman is understood to owe canonical obedience to the bishop who ordained him, to him in whose diocese he is beneficed, and also to the metropolitan of such suffragan; and therefore to kill any of these is petit treason. The punishment is, for a man, to be drawn and hanged; for a woman, it was to be drawn and burnt; but this barbarous act is now repealed; and the punishment made similar to that of the men. They, their aiders and abettors, are deprived the benefit of clergy.

TREA'SONABLE. Tre'asonous. *a.* (from *treason.*) Having the nature or guilt of treason (*Clarendon. Milton*).

TRE'ASURE. *s.* (*tresor*, French.) Wealth hoarded; riches accumulated (*Locke*).

To Tre'asure. *v. a.* (from the noun.) To hoard; to reposit; to lay up (*Rowe*).

TRE'ASUREHOUSE. *s.* (*treasure* and *house.*) Place where hoarded riches are kept (*Taylor*).

TREASURE TROVE, is where any money or coin, gold, silver, plate, or bullion, is hidden in the earth, or other private place, the owner thereof being unknown; in which case, the treasure belongs to the king, or some other who claims by the king's grant, or by prescription. But if he that hid it be known, or afterwards found out, the owner and not the king is entitled to it. If it be found in the sea, or upon the earth, it doth not belong to the king but to the finder, if no owner appear.

TREASURER, an officer to whom the treasure of a prince, or corporation, is committed to be kept, and duly disposed of. The lord high treasurer of Great Britain or first commissioner of the treasury, when in commission, has under his charge and government all the king's revenue, which is kept in the exchequer. He holds his place during the king's pleasure, being instituted by the delivery of a white staff to him: he has the check of all the officers employed in collecting the customs and other royal revenues; and in his gift and disposition are all the offices of the customs in the several ports of the kingdom; escheators in every county are nominated by him; he also makes leases of the lands belonging to the crown. There is, besides the lord treasurer, a treasurer of the king's household, who is of the privy council, and, with the comptroller and steward of the marshalsea, has great power. To these may be added the treasurer of the navy; as also the treasurer of the king's-chamber, and of the wardrobe; and most corporations throughout the kingdom have treasurers, whose office is to receive their rents, and disburse their common expences. The treasurer of the county is an officer that keeps the county-stock, in which office there are two in every county; who are chosen by the major part of the justices of the peace at Easter-sessions. They ought to have certain estates in lands, or to be worth 150*l.* in personal estate, and are to continue in their office only for a year, at the end whereof, or within ten days after the expiration of the year, they must account to their successors, under certain penalties. The county-stock, which this officer has the keeping of, is raised by rating every parish annually; and the same is from time to time disposed of to charitable uses, towards the relief of maimed soldiers and mariners, prisoners in the county gaols, paying the salaries of governors of houses of correction, and relieving poor alms-houses, &c.

TRE'ASURERSHIP. *s.* (from *treasurer.*) Office or dignity of treasurer.

TREASURY, the place wherein the revenues of a prince are received, preserved, and disbursed. In England the treasury is a part of the exchequer; by some called the lower exchequer. The officers of his majesty's treasury, or the lower exchequer, are the lords commissioners, one of whom is chancellor, two joint secretaries, private secretary to the first lord, two chamberlains, an auditor, four tellers, a clerk of the pells, ushers of the receipt, a tally-cutter, &c. See each officer under his proper article, Chancellor, Teller, Tally, &c.

Treasury (Lords of the). In lieu of one single director and administrator of his majesty's revenues under the title of lord high-treasurer, it is at present thought proper to put that office in commission, i. e. to appoint several persons to discharge it with equal authority, under the title of lords commisioners of the treasury.

To TREAT. *v. a.* (*traiter*, Fr. *tracto*, Lat.) 1. To negociate; to settle (*Dryden*). 2. To discourse on. 3. To use in any manner, good or bad (*Spectator*). 4. To handle; to manage; to carry on (*Dryden*). 5. To entertain without expence to the guest.

To Treat. *v. n.* (*traiter*, Fr. ꞇꞃahꞇian, Saxon.) 1. To discourse; to make discussions (*Milton*). 2. To practise negociation (2 *Mac.*). 3. To come to terms of accommodation (*Sw.*). 4. To make gratuitous entertainments (*Prior*).

Treat. *s.* (from the verb.) 1. An entertainment given (*Collier*). 2. Something given at an entertainment (*Dryden*).

TRE'ATABLE. *a.* (*traitable*, Fr.) Moderate; not violent (*Hooker*).

TRE'ATISE. *s.* (*tractatus*, Latin.) Discourse; written tractate (*Shakspeare*).

TRE'ATMENT. *s.* (*traitement*, French.) Usage; manner of using, good or bad (*Dryden*).

TRE'ATY. *s.* (*traité*, French.) 1. Negociation; act of treating (*Spenser*). 2. A compact of accommodation relating to public affairs (*Bacon*). 3. (for *entreaty*.) Supplication; petition; solicitation (*Shakspeare*).

TREBIA, a river of Italy, which rises in the territory of Genoa, washes Bobio in the Milanese, and falls into the Po, above Placentia. On the banks of this river the Romans, under the consul Sempronius, were defeated by Hannibal.

TREBIGNI, or Trebigna, a town of Turkish Dalmatia, with a bishop's see. The inhabitants are partly Turks and partly Greeks, and there are some papists. It is seated on the gulf of Venice, on the river Trebenska, 14 miles N. of Ragusa. Lon. 18. 11 E. Lat. 43. 4 N.

TREBISSIACI, a town of Naples, in Calabria Ulteriore, seated on the Tarento, five miles E. of Caffano.

TREBISOND, a large and strong seaport of Turkey in Asia, in Natolia, with a Greek archbishop's see, and a castle. It is seated at the foot of a very steep hill. The walls are square and high, with battlements; and are built with the ruins of ancient structures, on which are inscriptions not legible. The town is not populous; for there are more woods and gardens in it than houses, and these but one story high. The castle is seated on a flat rock, with ditches cut in it. The harbour is at the E. end of the town, and the mole built by the Genoese is almost destroyed. It stands on the Black Sea, 104 miles N.N.W. of Erzerum, and 440 E. of Constantinople. Lon. 40. 25 E. Lat. 40. 45 N.

TRE'BLE. *a.* (*triple*, French; *triplus*, *triplex*, Latin.) 1. Threefold; triple (*Sandys*). 2. Sharp of sound (*Bacon*).

To Tre'ble. *v. a.* (*triplico*, Latin; *tripler*, French.) To multiply by three; to make thrice as much (*Creech*).

To Tre'ble. *v. n.* To become threefold (*Swift*).

Treble. The highest of the parts in music. That which is sung by women and boys, and played on violins, hautboys, flutes, and other acute instruments.

TRE'BLENESS. *s.* (from *treble*.) The state of being treble (*Bacon*).

TRE'BLY. *ad.* (from *treble*.) Thrice told; in threefold number or quantity (*Ray*).

TREE. *s.* (*trie*, Islandic; *tree*, Danish.) 1. A large vegetable rising, with one woody stem, to a considerable height (*Locke*). 2. Any thing branched out (*Dryden*).

Tree. Arbor. A vegetable with a single woody trunk.—Trees (in Linnéus's Regnum Vegetabile) occupy the fifth tribe, division, or cast of the vegetable kingdom.—In the Artificial System they are incorporated with herbs that have the same character of the fructification. Ray and Tournefort kept them separate, but Rivinus had united them before Linnéus.

Tree celandine. See Bocconia.

Tree-frog, a species of frog, common to Europe and America, that lives in the shady branches and foliage of trees, and adheres strongly to the leaves by means of a mucus upon its orbicular, flattened claws. There are several varieties, for which see the article Rana.

It is peculiarly worthy of notice that this is one of those animals the colour of whose skin is rapidly changed upon being exposed to the shine or calorific rays of the sun: for, in this case, the natural colour, which is yellowish, is transmuted into a very dark green. In like manner the nereis lacustris is red while living in places accessible to the sun's rays, but white, like the leaves of plants when in obscurity.

These facts, and others closely connected with them, but to which we cannot at present advert, ought to have their weight in determining the cause of the difference in the colour of the skin in the different tribes and nations of mankind. See Physiology.

Tree germander. See Teucrium.

Tree mallow. See Lavatera.

Tree primrose. See Œnothera.

Tree of life. See Thuya.

TREEN. The old plural of *tree* (*Ben Jonson*).

Treen. *a.* Wooden; made of wood: obsolete (*Camden*).

TREFOIL (Shrubby). See Ptelea.

Trefoil (Moon). See Medicago.

Trefoil (Snail). See Medicago.

Trefoil (Bean). See Cytisus.

Trefoil (Tree). See Cytisus.

TREGANNON, a corporate town in Cardiganshire, with a market on Thursday. It is governed by a mayor, and seated on the Tyvy, 15 miles S.E. of Aberystwith, and 202 W. by N. of London. Lon. 3. 56 W. Lat. 52. 13 N.

TREGONY, a borough in Cornwall, with a market on Saturday. It is much decayed, has no church, and only 150 houses poorly built, but is governed by a mayor, and sends two members to parliament. It is seated on a creek by Falmouth haven, 41 miles W. by S. of Plymouth, and 245 of London. Lon. 4. 43 W. Lat. 50. 16 N.

TREI'LLAGE. *s.* (French.) A contexture of pales to support espaliers, making a distinct inclosure of any part of a garden (*Trevoux*).

TRE'LLIS. *s.* (French.) A structure of iron, wood, or osier, the parts crossing each other like a lattice (*Trevoux*).

To TRE'MBLE. *v. n.* (*trembler*, French; *tremo*, Latin.) 1. To shake as with fear or cold; to shiver; to quake; to shudder (*Rowe*). 2. To quiver; to totter (*Burnet*). 3. To quaver: to shake as a sound (*Bacon*).

TRE'MBLINGLY. *ad.* (from *trembling*.) So as to shake or quiver (*Pope*).

TREMELLA, in botany, a genus of the class cryptogamia, order algæ. Frond gelatinous, uniform, covered with a membranous integument, concealing the fructification. Sixty species, twenty of them indigenous to our own country, of all kinds of figures and colours.

TREME'NDOUS. *a.* (*tremendus*, Latin.) Dreadful; horrible; astonishingly terrible (*Pope*).

TREMESAN, or Tlemsan, a city of Algiers, in the province of Mascara. It is surrounded by strong walls, and inhabited by poor Arabs, Moors, and Jews. In the time of the Arabs, it was the residence of powerful princes; but is now dwindled to scarce a fifth part of the ancient city. Its once flourishing manufactures of carpets and woollen coverlets are in a state of decay; and the former masterpieces of architecture have disappeared, for there is not a single building of excellence now to be seen. It is 100 miles S.S.W. of Oràn. Lon. 1. 12 W. Lat. 34. 56 N.

TREMITI, three islands of Naples in the gulf of Venice, 15 miles from the N. coast of Capitanata. They are called Tremiti or St. Nicolo, St. Domino, and Capraria. The first, which is the principal of them, has a Benedictine convent and a castle. Lon. 15. 30 E. Lat. 42. 10 N.

TREMOLITES. Tremolite. In mineralogy, a genus of the class earths, order calcareous. Consisting of carbonat of lime, a larger proportion of silex, a little carbonat of magnesia, water and carbonic acid gass; radiate, hardish, shining, brittle, emitting a phosphorescent light in the dark when struck or rubbed: partly soluble in nitric acid with effervescence. One species; tremolites Hoepfneri; tremolite; tremolit; grammattite; siliciferous marlite. Found in mount Tremola, near St. Gothard's, in Swisserland, white, reddssh, greenish, yellowish, or greyish; sometimes amorphous, sometimes in crystals longitudinally striate; contains silex 65,0, lime 38,0, magnesia 0,5, oxyd of iron 0,5, water and carbonic acid 6,0.

TREMOLO, Tremolante, or Tremente, in music, words intimating that the notes are to be drawn out with a tremulous motion, in imitation of the beatings of an organ.

TRE'MOUR. *s.* (*tremor*, Latin.) 1. The state of trembling (*Harvey*). 2. Quivering or vibratory motion (*Newton*).

TRE'MULOUS. *a.* (*tremulus*, Latin.) 1. Trembling; fearful (*Decay of Piety*). 2. Quivering; vibratory (*Holder*).

TRE'MULOUSNESS. *s.* (from *tremulous*.) The state of quivering.

TREN. *s.* A fish spear (*Ainsworth*).

To TRENCH. *v. a.* (*trancher*, French.) 1. To cut (*Shakspeare*). 2. To cut or dig into pits or ditches (*Pope*). 3. To fortify by earth thrown up (*Milton*).

Trench. *s.* (*tranche*, French.) 1. A pit or ditch (*Mortimer*). 2. Earth thrown up to defend soldiers in their approach to a town, or to guard a camp. See Fortification.

TRE'NCHANT. *a.* (*trenchant*, Fr.) Cutting; sharp (*Hudibras*).

TRE'NCHER. *s.* (from *trench*; *trenchoir*, French.) 1. A piece of wood on which meat is cut at table (*More*). 2. The table (*Shaksp.*). 3. Food; pleasures of the table (*South*).

TRE'NCHERFLY. *s.* (*trencher* and *fly*.) One that haunts tables; a parasite (*L'Estrange*).

TRE'NCHERMAN. *s.* (*trencher* and *man*.) 1. A cook: obsolete (*Sidney*). 2. A feeder; an eater (*Shakspeare*).

TRE'NCHERMATE. *s.* (*trencher* and *mate*.) A table companion; a parasite (*Hooker*).

To TREND. *v. n.* To tend; to lie in any particular direction (*Dryden*).

TRE'NDLE. *s.* (ꞇꞃenꝺel, Saxon.) Any thing turned round. Now improperly written *trundle*.

TRENT, a principality of Germany, lately a bishopric, in the S. part of Tyrol, among the Alps, bounded by Tyrol Proper, and the territories of Venice. It produces excellent wine.

Trent, a fortified city, capital of the principality of Trent, with a handsome castle, a cathedral, three parish-churches, a college, and some convents. It is famous in church history for a celebrated council, which was held from 1545 to 1563. This city was several times in the hands of the French during the late war. It is situate between two mountains, on the river Adige, 67 miles N.W. of Venice. Lon. 10. 55 E. Lat. 46. 2 N.

Trent, a river which rises in Staffordshire, from three springs to the W. of Leek, and flows S.E. through the county to the S.W. borders of Derbyshire, where it receives the Tame. It then takes a N.E. direction, between the two counties, till it receives the Dove, when it enters Derbyshire, crosses its S. angle, and forming, for a short space, its separation from the counties of Leicester and Nottingham, it enters the latter county at its S.W. extremity; thence crossing obliquely to the E. it flows along its whole eastern side, forming, toward the N. part, the boundary between that county and Lincolnshire, a corner of which it crosses, and, below Gainsborough, meets the Ouse on the borders of Yorkshire, where their united stream forms the Humber. This river is of itself navigable from Burton in Staffordshire; and by canals it has a communication with the Mersey, the Severn, and the Thames.

Trent, a river of N. Carolina, which runs into the Neus, at Newbern, where it is three quarters of a mile broad.

Trent (Council of), in ecclesiastical history, denotes the council assembled by Paul III. in 1545, and continued by 25 sessions till the year 1563, under Julius III. and Pius IV. in order to correct, illustrate, and fix with perspicuity, the doctrine of the church, to restore the vigour of its discipline, and to reform the lives of its ministers. But it has been a matter of complaint by many, both in and out of the communion of the church of Rome, that this assembly, instead of reforming ancient abuses, rather gave rise to new enormities. It is alleged, that opinions of the scholastic doctors on intricate points, which had been left undecided, were by this council absurdly adopted as articles of faith, and imposed with violence upon the consciences of the people, under pain of excommunication: that there is an ambiguity in the decrees and declarations of this council, which renders the disputes and dissensions, that had rent the church, more intricate and perplexed, and which really multiplies and propagates, instead of lessening and suppressing them: that matters were decided in this assembly, according to the despotic will of the Roman pontiff, without regard to the dictates of truth or the authority of scripture: and that the few wise and pious regulations, that were made in this council, were never supported by the authority of the church, but suffered to degenerate into a mere lifeless form or shadow of law, which was treated with indifference and transgressed with impunity. It will not, therefore, appear surprising, that there are certain doctors in the Romish church, who, instead of submitting to the decisions of the council of Trent, as an ultimate rule of faith, maintain that these decisions are to be explained by the dictates of scripture and the language of tradition: nor can we wonder that this council has not every where the same degree of credit and authority, even in those countries that profess the Roman catholic religion. Some countries, indeed, such as Germany, Poland, and Italy, have adopted implicitly and absolutely the decrees of this council, without the least restriction. But in other places it has been received and acknowledged on certain conditions, which modify, not a little, its pretended authority. Among these latter we may reckon the Spanish dominions, which, during many years, disputed the authority of this council, and at length acknowledged it only so far as it could be adopted without any prejudice to the rights and prerogatives of the king of Spain. In other countries, such as France and Hungary, it has never been solemnly received or publicly acknowledged. Indeed in the former of these kingdoms, those decrees of Trent that relate to points of religious doctrine, tacitly and imperceptibly, through the power of custom, acquired the force and authority of a rule of faith; but those which regard external discipline, spiritual power, and ecclesiastical government, have been constantly rejected, both in a public and private manner, as inconsistent with the authority and prerogatives of the throne, and prejudicial to the rights and liberties of the Gallican church.

Notwithstanding the preceding remarks, the decrees of the council of Trent, together with the creed of pope Pius IV. contain a summary of the principal heads of the Roman catholic religion. See Popery.

However in these decrees and confession of faith, many things are expressed in a vague and ambiguous manner, with a view to the intestine divisions then prevalent in the church: and several tenets are omitted in both, which no Roman catholic is allowed to deny, or even to question. But it must be acknowledged, that in these decrees, and in this confession, several doctrines and rules of worship, particularly pertaining to the doctrine of purgatory, the invocation of saints, and the worship of images and relics, are inculcated in a much more rational and decent manner than that in which they appear in the daily service of the church, and in the public practice of its members: and it is to be observed, that in deducing a just notion of the doctrine of Rome from the decrees of the council of Trent, regard ought to be had, not so much to the terms made use of in these decrees as to the real signification of these terms, which must be drawn from the customs, institutions, and observances, that are, every where, in use in the Romish church.—Mosh. Eccl. Hist. vol. iii.

TRE'NTALS. *s.* (*trente*, French.) A number of masses, to the tale of thirty, said on the same account (*Ayliffe*).

TRENTON, a town of New Jersey, in Hunterdon county, and the capital of the state. Here are four edifices for public worship, and a flourishing academy. It is seated on the Delaware, 30 miles N.E. of Philadelphia. Lon. 75. 0 W. Lat. 40. 15 N.

TREPAN. (*trepanum*, from τρυπαω, to perforate, whence it is obvious that it should be written trypan, and trypanum.) An instrument used by surgeons to remove a portion of bone from the calvaria.

Tre'pan. *s.* A snare; a stratagem by which any one is ensnared.

To **Trepa'n.** *v. a.* (from the noun.) 1. To perforate with the trepan (*Arbuthnot*). 2. To catch; to ensnare (*South*).

TRE'PHINE. *s.* A small trepan; a smaller instrument of perforation managed by one hand (*Wiseman*).

TREPIDA'TION. *s.* (*trepidatio*, Latin.) 1. The state of trembling, or quivering (*Bac.*). 2. State of terrour (*Wotton*). 3. Hurry; confused haste.

TREPINGER, in the manage, is the action of a horse, that beats the dust with his fore-feet in managing, without embracing the volt; and that makes his motions and times short, and near the ground, without being put upon his haunches. This is generally the fault of such horses as have stiff shoulders. A horse may trepinger in going upon a straight line.

TREPORT, a town of France, in the department of Lower Seine, seated on the English channel, at the mouth of the Bresle. It is the port for the town of Eu, nearly two miles distant, and is 17 miles N.E. of Dieppe.

To TRE'SPASS. *v. n.* (*trespasser*, Fr.) 1. To transgress; to offend (*Norris*). 2. To enter unlawfully on another's ground (*Prior*).

TRE'SPASS. *s.* (*trespas*, French.) 1. Transgression; offence (*Milton*). 2. Unlawful entrance on another's ground.

TRE'SPASSER. *s.* (from *trespass*.) 1. An offender; a transgressor. 2. One who enters unlawfully on another's ground (*Walton*).

TRE'SSED. *a.* (from *tresser*, Fr.) Knotted or curled (*Spenser*).

TRE'SSES. *s.* without a singular. (*tresse*, French; *treccia*, Italian.) A knot or curl of hair (*Shakspeare. Milton*).

TRE'STLE. *s.* (*tresteau*, French.) 1. The frame of a table. 2. A moveable form by which any thing is supported.

TRET. *s.* (probably from *tritus*, Lat.) An allowance made by merchants to retailers, which is four pounds in every hundred weight, and four pounds for waste or refuse of a commodity (*Bailey*).

TRE'THINGS. *s.* (*trethingi*, low Lat. from *trethu*, Welsh, to tax.) Taxes; imposts.

TREUCENBRIETZEN, a town of Upper Saxony, in the middle marche of Brandenburg, 20 miles S. of Brandenburg, and 34 S.W. of Berlin. Lon. 12. 43 E. Lat. 52. 5 N.

TREVES, or TRIERS, an electorate of Germany, in the circle of Lower Rhine; bounded on the N. by the electorate of Cologne, on the E. by Weteravia, on the S. by the palatinate of the Rhine and Lorrain, and on the W. by Luxemburg. It is 100 miles in length, but the breadth is very different; and is full of mountains and forests. Near the Rhine and Moselle, the soil is fruitful, abounding in corn and wine; and it is more populous there than in other parts. Its inhabitants have suffered greatly in the wars with France.

TREVES, or TRIERS, a celebrated city of Germany, in the circle of Lower Rhine, capital of an archbishopric of the same name, whose archbishop is an elector of the empire. It has a university, several remains of antiquity, and as many churches as any town in Germany. It has greatly suffered by war, and is now neither large nor populous. It was taken by the French in 1794. It is seated on the Moselle (over which is a handsome bridge) between two mountains, 20 miles N.E. of Luxemburg, 55 S. by E. of Cologne, and 450 W.N.W. of Vienna. Lon. 6. 41 E. Lat. 49. 45 N.

TRE'VET. *s.* (ꞇꞃıeꝼeꞇ, Saxon; *trepied*, Fr.) Any thing that stands on three legs; as, a stool.

TREVI, a town of Italy, in Umbria, 23 miles S.E. of Perugia. Lon. 11. 51 E. Lat. 42. 54 N.

TREVIGLIO, a town of Italy, in the duchy of Milan, 17 miles E.N.E. of Milan. Lon. 9. 28 E. Lat. 45. 35 N.

TREVIGO, a town of Naples, in Principato Ulteriore, with a bishop's see, 23 miles E. of Benevento. Lon. 15. 20 E. Lat. 42. 6 N.

TREVINO, a strong town of Spain, in Biscay, with a citadel, seated on a hill, near the river Aguda, 10 miles S.W. of Vittoria. Lon. 3. 4 W. Lat. 42. 48 N.

TREVISANO, a marquisate of Italy, in the republic of Venice; bounded on the E. by Friuli and the gulf of Venice, on the S. by that gulf, the Dogado, and the Paduano, on the N. by the Feltrino and the Bellunese, and on the W. by the Vicentino. The soil is fertile, and produces corn, wine, and wood; and they export cattle, silk, and woollen cloth. Treviso is the capital.

TREVISO, or TREVIGIO, a large city of Italy, capital of Trevisano, with an archbishop's see. It had formerly a university, which was transferred to Padua. It is the residence of many noble families, and seated on the Silis, 20 miles N.W. of Venice. Lon. 12. 25 E. Lat. 45. 44 N.

TREVOUX, a town of France, in the department of Ain. The most remarkable buildings are the ancient mint, the late parliament house, the governor's house, and the printing-office. The latter is celebrated for the Literary Journals composed by the Jesuits of the college of Louis le Grand. Trevoux is seated on the side of a hill, on the river Saone, 12 miles N. of Lyons, and 188 S. by E. of Paris. Lon. 4. 51 E. Lat. 45. 54 N.

TREY. *s.* (*tres*, Latin; *trois*, French.) A three at cards (*Shakspeare*).

TRI'ABLE. *a.* (from *try*.) 1. Possible to be experimented; capable of trial (*Boyle*). 2. Such as may be judicially examined (*Ayliffe*).

TRI'AD. *s.* (*trias*, Lat. *triade*, Fr.) Three united.

TRI'AL. *s.* (from *try*.) 1. Test; examination (*Shakspeare*). 2. Experiment; act of examining by experience (*Bacon*). 3. Experience; experimental knowledge (*Hebrews*). 4. Judicial examination (*Cowell*). 5. Temptation; test of virtue (*Rogers*). 6. State of being tried (*Shakspeare*).

TRIAL, in law, the examination of a cause, civil or criminal, according to the laws of the land, before a proper judge: or, it is the manner and order observed in the hearing and determining of causes. There are divers kinds of trials; as those of matters of fact, which must be tried by a jury; matters of law, which are only triable by the courts; and matters of record, which are to be tried by the records themselves. The most general rule has been, that the jurymen on a trial shall be chosen out of that town or precinct, &c. in which the matter of fact is alleged, or the nearest thereto, for the better cognizance of the matter; and not to leave things to be tried in foreign counties, where the jury are strangers to the whole matter. Where any trial is for murder, it must be in the county wherein the fact was committed; but if the assault is in one county, and the person assaulted happens to die in another county, the indictment may be found by a jury of the county where the party died: and by special commission, when a person is indicted in one county he may be tried in another. In all criminal cases the custom is to ask the prisoner how he will be tried, which was formerly a very significant question, though it is not so now; because anciently there were trials by combat, by ordeal, and by jury; and when the prisoner answered, By God and his country, it appeared he made choice to be tried by a jury; which is the only way now used for the trial of criminals.

The method of proceeding in a criminal case is this: First the bill of indictment against the offender is prepared, and the prosecutor and his witnesses attend on the grand jury, and there give in their evidence; which being done, the grand inquest either find the bill of indictment, or bring it in ignoramus; and if the bill is found, the prisoner is brought to the bar of the court, and the clerk of the arraigns calling him by his name, desires him to hold up his hand, saying, "Thou art indicted by the name of ——, for such a felony, &c. (setting forth the crime laid in the indictment). How sayest thou; art thou guilty of this felony whereof thou art indicted, or not guilty?" To which the prisoner answering, "Not guilty," the clerk says, "Culprit, how wilt thou be tried?" whereupon the defendant answers, "By God and my country;" which plea of the prisoner the clerk records, and then the panel of the petty jury is called over.

After the jury are sworn, and the indictment is read over to them, and they are charged, the evidences on both sides, for and against the prisoner, are called, sworn, and examined in open court; after which the jury bring in their verdict; and if they find the prisoner guilty, their verdict is recorded, and the prisoner is taken from the bar: but if they bring him in not guilty, the prisoner is discharged. On the prisoner being brought in guilty, proclamation is made for all persons to keep silence, upon which the prisoner is again brought to the bar, and the verdict repeated: after which sentence is passed on him, and an order or warrant is made for his execution.

The methods of trial, in our civil courts, are as follows: viz. The declaration is first drawn for the plaintiff, and when the appearance of the defendant is entered, it has been usual to deliver it with an imparlance to the defendant's attorney; and the term following, rule is to be given with the secondary for the defendant to plead by such a day, or else the plaintiff is to have judgment: and the defendant having pleaded, a copy of the issue is made by the plaintiff, and delivered to the defendant's attorney, at the same time giving him notice of the trial; in order to which the venire facias must be taken out and returned by the sheriff, and likewise the habeas corpora, or distringas, to bring in the jury; on which the record is made up, and the parties proceed to trial by their counsel and witnesses; and the jury give in their verdict, &c. But in case the defendant neglects to plead, and suffers it to go by default, on entering such a judgment, a writ of inquiry of damages is awarded, returnable next term, notice of the execution whereof the defendant's attorney is to have; and which being executed, and the damages inserted in a schedule annexed to the writ, a rule is given, and costs are taxed by the prothonotary, &c.

See, farther, ASSIZES, INDICTMENT, JURY, ORDEAL, SESSIONS, &c.

TRIANDRIA. (τρεις, three, and ανηρ, a husband.) The name of the third class in the Linnéan System, comprehending those plants which bear hermaphrodite flowers with three stamens.—The second order, digynia, contains most of the grasses. See BOTANY.

TRIANGLE, in geometry, a figure bounded or contained by three lines or sides, and which consequently has three angles, from whence the figure takes its name.

Triangles are either plane, or spherical, or curvilinear. Plane when the three sides of the triangle are right lines; but spherical when some or all of them are arcs of great circles on the sphere.

Plane triangles take several denominations, both from the relation of their angles, and of their sides, as below. See GEOMETRY.

The chief properties of plane triangles are as follow, viz. In any plane triangle,

1. The greatest side is opposite to the greatest angle, and the least side to the least angle, &c. Also, if two sides are equal, their opposite angles are equal; and if the triangle is equilateral, or has all its sides equal, it will also be equiangular, or have all its angles equal to one another. 2. Any side of a triangle is less than the sum, but greater than the difference, of the other two sides. 3. The sum of all the three angles, taken together, is equal to two right angles. 4. If one side of a triangle is produced out, the external angle, made by it and the adjacent side, is equal to the sum of the two opposite internal angles. 5. A line drawn parallel to one side of a triangle cuts the other two sides proportionally, the corresponding segments being proportional, each to each, and to the whole sides; and the triangle cut off is similar to the whole triangle.

If a perpendicular is let fall from any angle of a triangle, as a vertical angle, upon the opposite side as a base; then, 6. The rectangle of the sum and difference of the sides, is equal to twice the rectangle of the base and the distance of the perpendicular from the middle of the base. Or, which is the same thing in other words, 7. The difference of the squares of the sides, is equal to the difference of the squares of the segments of the base. Or, as the base is to the sum of the sides, so is the difference of the sides to the difference of the segments of the base. 8. The rectangle of the legs or sides is equal to the rectangle of the perpendicular and the diameter of the circumscribing circle.

If a line is drawn bisecting any angle, to the base or opposite side; then, 9. The segments of the base, made by the line bisecting the opposite angle, are proportional to the sides adjacent to them. 10. The square of the line bisecting the angle, is equal to the difference between the rectangle of the sides and the rectangle of the segments of the base.

If a line is drawn from any angle to the middle of the opposite sides or bisecting the base, then, 11. The sum of the squares of the sides, is equal to twice the sum of the squares of half the base and the line bisecting the base. 12. The angle made by the perpendicular from any angle and the line drawn from the same angle to the middle of the base, is equal to half the difference of the angles at the base. 13. If through any point within a triangle three lines are drawn parallel to the three sides of the triangle, the continual products or solids made by the alternate segments of these lines will be equal. 14. If three lines are drawn from the three angles through any point within a triangle, to the opposite sides; the solid products of the alternate segments of the sides are equal, viz. 15. Three lines drawn from the three angles of a triangle to bisect the opposite sides, or to the middle of the opposite sides, do all intersect one another in the same point, and that point is the centre of gravity of the triangle; and the distance of that point from any angle is equal to double the distance from the opposite side, or one segment of any of these lines is double the other segment: moreover, the sum of the squares of the three bisecting lines is ¾ of the sum of the squares of the three sides of the triangle. 16. Three perpendiculars bisecting the three sides of a triangle, all intersect in one point, and that point is the centre of the circumscribing circle. 17. Three lines bisecting the three angles of a triangle, all intersect in one point, and that point is the centre of the inscribed circle. 18. Three perpendiculars drawn from the three angles of a triangle upon the opposite sides, all intersect in one point. 19. Any triangle may have a circle circumscribed about it, or touching all its angles, and a circle inscribed within it, or touching all its sides. 20. The square of the side of an equilateral triangle is equal to three times the square of the radius of its circumscribing circle. 21. If the three angles of one triangle are equal to the three angles of another triangle, each to each, then those two triangles are similar, and their like sides are proportional to one another, and the areas of the two triangles are to each other as the squares of their like sides. 22. If two triangles have any three parts of the one (except the three angles) equal to three corresponding parts of the other, each to each, those two triangles are not only similar, but also identical, or having all their six corresponding parts equal, and their areas equal. 23. Triangles standing upon the same base, and between the same parallels are equal; and triangles upon equal bases, and having equal altitudes, are equal. 24. Triangles on equal bases are to one another as their altitudes, and triangles of equal altitudes are to one another as their bases; also equal triangles have their bases and altitudes reciprocally proportional. 25. Any triangle is equal to half its circumscribing parallelogram; or half the parallelogram on the same or an equal base, and of the same or equal altitude. 26. Therefore the area of any triangle is found by multiplying the base by the altitude, and taking half the product. 27. The area is also found thus: multiply any two sides together, and multiply the product by the sine of their included angle, to radius 1 and divided by 2. 28. The area is also otherwise found thus, when the three sides are given: add the three sides together, and take half their sum; then from this half sum subtract each side severally, and multiply the three remainders and the half sum continually together; then the square root of the last product will be the area of the triangle. 29. In a right-angled triangle, if a perpendicular is let fall from the right angle upon the hypothenuse, it will divide it into two other triangles similar to one another, and to the whole triangle. 30. In a right-angled triangle, the square of the hypothenuse is equal to the sum of the squares of the two sides; and, in general, any figure described upon the hypothenuse is equal to the sum of two similar figures described upon the two sides. 31. In an isosceles triangle, if a line is drawn from the vertex to any point in the base, the square of that line, together with the rectangle of the segments of the base, is equal to the square of the side. 32. If the three sides of a triangle are 4, 5, and 6, then is the largest angle double the smallest, the three being 41·°409603, 55·°771191 and 82·°819206, respectively. See GEOMETRY. See also the article TRIANGLE, in Hutton's Dictionary.

TRIANGLE (Arithmetical), a kind of numeral triangle, or triangle of numbers, being a table of certain numbers disposed in form of a triangle. It was so called by Pascal; but he was not the inventor of this table, as some writers have imagined, its properties having been treated of by other authors some centuries before him, as is shewn in Dr. Hutton's Mathematical Tracts, vol. i.

The form of the triangle is as follows:

1					
1	1				
1	2	1			
1	3	3	1		
1	4	6	4	1	
1	5	10	10	5	1
1	6	15	20	&c.	
1	7	21	&c.		
1	8	&c.			
1	9				
1					

And it is constructed by adding always the last two numbers of the next two preceding columns together, to give the next succeeding column of numbers.

The first vertical column consists of units; the second, a series of the natural numbers 1, 2, 3, 4, 5, &c.; the third, a series of triangular numbers 1, 3, 6, 10, &c.; the fourth, a series of pyramidal numbers, &c. The oblique diagonal rows, descending from left to right, are also the same as the vertical columns. And the numbers taken on the horizontal lines are the co-efficients of the different powers of a binomial. Many other properties and uses of these numbers have been delivered by various authors, as may be seen in the Introduction to Hutton's Mathematical Tables, pages 7, 8, 75, 76, 77, 89, second edition.

TRIANGLE. A steel musical instrument, so called from its consisting of three bars of polished steel, so united at their ends as to produce a triangular frame.

TRI'ANGULAR. *a.* (*triangularis*, Latin.) Having three angles (*Ray*).

TRIANGULAR COMPASSES, are such as have three legs or feet, by which any triangle, or three points, may be taken off at once. These are very useful in the construction of maps, globes, &c.

TRIANGULAR NUMBERS, are a kind of polygonal numbers; being the sums of arithmetical progressions, which have 1 for the common difference of their terms.

Thus, from these arithmeticals 1 2 3 4 5 6, are formed the triang. numbers 1 3 6 10 15 21; or the third column of the arithmetical triangle above-mentioned.

The sum of any number n of the terms of the triangular numbers, 1, 3, 6, 10, &c. is =

$$\frac{n^3}{6}+\frac{n^2}{2}+\frac{n}{3}, \text{ or } \frac{n}{1}\times\frac{n+1}{2}\times\frac{n+2}{3}$$

which is also equal to the number of shot in a triangular pile of balls, the number of rows, or the number in each side of the base, being n.

The sum of the reciprocals of the triangular series, infinitely continued, is equal to 2; viz.

$$1+\tfrac{1}{3}+\tfrac{1}{6}+\tfrac{1}{10}+\tfrac{1}{15}, \text{ \&c.} = 2.$$

For the rationale and management of these numbers, see Malcolm's Arith. book 5. ch. 2.; Simpson's Algeb. sec. 15; and the works of Gauss, Legendre, and Barlow, on the theory of numbers.

TRIANGULAR STEM, in botany. Triangularis caulis. Ex numero angulorum prominentium. A stem is called triangular, quadrangular, &c. from the number of prominent angles. In these terms respect is had only to the number of angles.—Trigonous, tretragonous, &c. are variations of the doubtful stem, in which the angles are sharp, and the sides not flat.—Triquetrous must have three flat sides.

TRIANGULAR LEAF. Cum tres anguli prominentes ambiunt discum. "This seems to me," says professor Martyn, "an inaccurate expression; for how angles can surround a disk I do not understand. I apprehend Linnéus to mean no more than that every leaf having three angles in the circumference is a triangular leaf, whatever its form may be in other respects."

TRIANGULARIS, in myology. See STERNO-COSTALIS.

TRIANGULARIS. See also DEPRESSOR ANGULI ORIS.

TRIANTHEMA, in botany, a genus of the class decandria, order digynia. Calyx mucronate, under the lip; corolless; stamens five or ten; germ retuse; capsule opening transversely all round. Seven species; natives of Asia, America, and the Cape.

TRIARIUS, a friend of Pompey, who had for some time the care of the war in Asia against Mithridates, whom he defeated, and by whom he was afterwards beaten. He was killed in the civil wars of Pompey and Cæsar.

TRIBALLI, a people of Thrace; or, according to some, of Lower Mœsia. They were conquered by Philip, the father of Alexander; and some ages after, they maintained a long war against the Roman emperors.

TRIBE. *s.* (*tribus*, Latin.) 1. A distinct body of the people as divided by family or fortune, or any other characteristic (*Ben Jonson*). 2. It is often used in contempt (*Roscommon*).

TRIBES OF VEGETABLES. Tribus vegetabilium, are reckoned to be three, in Regn. Veg.

1. Monocotyledonous, containing palms, corn, and grasses, liliaceous plants; the three first gentes or nations.

2. Dicotyledonous, comprising herbs and trees; the fourth and fifth nations.

3. Acotyledonous, or cryptogamic; the ferns, mosses, algas, and funguses; which are the four last nations. In many of these last, however, a cotyledon has been since discovered; and it is daily giving way to the polycotyledonous, or plants containing more than two cotyledons. See COTYLEDON.

TRIBESERS, a town of Upper Saxony, in Swedish Pomerania, with a castle, seated on the Trebel, 22 miles S.S.W. of Stralsund, and 30 E.S.E. of Rostock. Lon. 13. 8 E. Lat. 54. 1 N.

TRIBULA'TION. *s.* (*tribulation*, French.) Persecution; distress; vexation; disturbance of life (*Atterbury*).

TRIBULUS AQUATICUS. (τριβυλος, from τριβω, to vex, an instrument of war to be thrown in the way to annoy the enemy's horse: hence the name of an herb, from its resemblance to this instrument.) Nux aquatica. The fruit of the trapa nata of Linnéus, of a quadrangular and somewhat oval shape, including a nut of a sweet farinaceous flavour, somewhat like that of the chesnut, which is apt to constipate the bowels, and produce disease: a poultice of these nuts is said to be efficacious in resolving hard and indolent tumours.

TRIBULUS. Caltrops. In botany, a genus of the class decandria, order monogynia. Calyx five-parted; petals five, spreading; styleless;

capsules five, gibbous, spinous, many-seeded. Four species; natives of the East or West Indies, or south of Europe.

TRIBU′NAL. *s.* (*tribunal*, Latin and Fr.) 1. The seat of a judge (*Waller*). 2. A court of justice (*Milton*).

TRI′BUNE. *s.* (*tribun*, *tribunus*, Latin.) 1. An officer of Rome chosen by the people (*Shakspeare*). 2. The commander of a Roman legion. See TRIBUNI.

TRIBUNI PLEBIS, magistrates at Rome, created in the year U. C. 261, when the people after a quarrel with the senators had retired to Mons Sacer. The two first were C. Licinius, and L. Albinus, but their number was soon after raised to five, and 37 years after to 10, which remained fixed. Their office was annual. Their power, though at first small, soon became formidable. They could summon assemblies, propose laws, stop the consultations of the senate, and even abolish their decrees by the word *Veto*. Their approbation was also necessary to confirm the *senatus consulta*, and this was done by affixing the letter T under it. If any irregularity happened in the state, their power was almost absolute; they criticised the conduct of all the public magistrates, and even dragged a consul to prison, if the measures he pursued were hostile to the peace of Rome. The dictator alone was their superior. The people paid them so much deference, that their person was held sacred, and thence they were always called *Sacrosancti*. Yet great as their power might appear, they received a heavy wound from their number, and as their consultations and their resolutions were of no effect if they were not all unanimous, the senate often took advantage of their avarice, and by gaining one of them by bribes, they, as it were, suspended the authority of the rest. Sylla, when raised to the dictatorship, gave a fatal blow to the authority of the tribunes, and by one of his decrees, they were no longer permitted to harangue and inflame the people. This disgrace, however, was but momentary; at the death of the tyrant the tribunes recovered their privileges by means of Cotta and Pompey the great. The office of tribune remained in full force till the age of Augustus, who, to make himself more absolute, and his person sacred, conferred the power and office upon himself, whence he was called *tribunitia protestate donatus*. His successors on the throne imitated his example, and as the emperor was the real and official tribune, such as were appointed to the office were merely nominal, without power or privilege. Under Constantine the tribuneship was totally abolished.—There were also other officers who bore the name of tribunes, such as the *tribuni militum* or *militares*, who commanded a division of the legions. They were empowered to decide all quarrels that might arise in the army, they took care of the camp, and gave the watch-word.—There were also some officers called *tribuni militum consulari protestate*, elected instead of consuls, A. U. C. 310.—The *tribuni ærarii* were officers chosen from among the people, who kept the money which was to be applied to defray the expences of the army.—The *tribuni celerum* had the command of the guard which Romulus chose for the safety of his person. They were 100 in number, distinguished for their probity, their opulence, and their nobility.—The *tribuni voluptatum* were commissioned to take care of the amusements which were prepared for the people, and that nothing might be wanting in the exhibitions. This office was also honourable.

TRIBUNI′TIAL. TRIBUNI′TIOUS. *a.* (*tribunitius*, Latin.) Suiting a tribune; relating to a tribune (*Bacon*).

TRI′BUTARY. *a.* (*tributaire*, French; *tributarius*, Latin.) 1. Paying tribute as an acknowledgment of submission to a master (*Dryden*). 2. Subject; subordinate (*Prior*). 3. Paid in tribute (*Concanen*).

TRI′BUTARY. *s.* (from *tribute*.) One who pays a stated sum in acknowledgment of subjection (*Davies*).

TRI′BUTE. *s.* (*tribut*, French; *tributum*, Lat.) Payment in acknowledgment; subjection (*Matthew*).

TRICE. *s.* (probably from *trait*, French, corrupted by pronunciation.) A short time; an instant; a stroke (*Bentley*).

TRICEPS, in anatomy. Adductor femoris. (*triceps*, from *tres*, three, and *caput*, a head; having three heads.) Under this appellation are comprehended three distinct muscles. See ADDUCTOR BREVIS, LONGUS, and MAGNUS FEMORIS.

TRICEPS EXTENSOR CUBITI. This muscle, which occupies all the posterior part of the os humeri, is described as two distinct muscles by Douglas, and as three by Winslow. The upper part of its long head is covered by the deltoides: the rest of the muscle is situated immediately under the integuments.

It arises, as its name indicates, by three heads. The first, or long head, (the long head of the biceps externus, of Douglas; anconeus major, of Winslow, as it is called,) springs, by a flat tendon of an inch in breadth, from the anterior extremity of the inferior costa of the scapula, near its neck, and below the origin of the teres minor. The second head, (the short head of the biceps externus of Douglas; anconeus externus, of Winslow), arises by an acute tendinous and fleshy beginning, from the upper and outer part of the os humeri, at the bottom of its great tuberosity. The third head, (brachialis externus, of Douglas; anconeus internus, of Winslow), which is the shortest of the three, originates by an acute fleshy beginning, from the back part of the os humeri, behind the flat tendon of the latissimus dorsi. These three portions unite about the middle of the arm, so as to form one thick and powerful muscle, which adheres to the os humeri to within an inch of the elbow, where it begins to form a broad tendon, which, after adhering to the capsular ligament of the elbow, is inserted into the upper and outer part of the olecranon, and sends off a great number of fibres, which help to form the fascia on the outer part of the fore-arm.

The use of this muscle is to extend the fore-arm.

TRICERA, in botany, a genus of the class monœcia, order tetrandria. Male: calyx four-leaved; corolless; filaments ovate. Female: calyx five-leaved; corolless; styles three, conical; capsule three-horned, three-celled; seeds in pairs. One species; a Jamaica shrub, with square branches, lanceolate leaves, flowers in simple axillary umbels.

TRICHECHUS. Morse. Walrus. Manati. In zoology, a genus of the class mammalia, order bruta. Fore-toothless in both jaws in the adult; tusks upper solitary, grinders in both jaws consisting of a furrowed bone; body oblong; lips double; hind-feet stretched back, forming a fin. Three species; all of which inhabit the sea; feed on corallines, and shell-worms, and not on flesh.

1. T. rosmarus. Morse. Sea-horse. Sea-cow. Tusks in the upper jaw remote, projecting. This animal has a round head; small mouth; very thick lips, covered above and below with pellucid bristles as thick as straws; small fiery eyes; two small orifices instead of ears, and a short neck: body thick in the middle, tapering toward the tail: skin thick, wrinkled, with short brownish hair thinly dispersed: short legs, five toes on each foot, connected by a web, and a small nail on each: hind feet very broad: each leg loosely articulated: the hind-legs generally extended on a line with the body: tail very short, and penis long. Eighteen feet long, ten or twelve round the thickest part: the tusks very remote, acuminate, sometimes weighing thirty pounds each, the ivory with interwoven fibres not easily turning yellow, the central part brownish. The young have two small fore-teeth in the upper jaw.

They inhabit the coast of Spitzbergen, Nova Zembla, Hudson's Bay, the gulf of St. Laurence, and the Icy Sea; but are not traced in the islands between Kamschatka and America. They are gregarious, and are seen in some places in herds of a hundred together: are very shy, and avoid places much haunted by man. They are, however, extremely fierce, and if wounded in the water, attempt to sink the boat, either by rising under it, or by striking their great teeth into its sides. They roar very loud; and will follow the boat till it gets out of sight. Numbers of them are often seen sleeping on islands of ice: if awakened, they fling themselves with great impetuosity into the sea. They do not go upon the land till the coast is clear of ice. At particular times they land in amazing numbers. The moment the first gets on shore, so as to lie dry, it will not stir till another comes and forces it forward, by beating it with its great teeth; this is served in the same manner by the next; and so on in succession till the whole have landed.

In the gulf of St. Laurence, those who hunt them watch their landing; and as soon as they find a sufficient number, they go on shore, each armed with a spear, sharp on one side like a knife, with which they cut their throats. One walrus produces about half a ton of oil. Buffon says he has seen braces for coaches made of their skin, which were both strong and elastic.

They bring one, or at most two, young at a time; they feed on sea herbs, fishes, and shells, which they dig out of the sands with their teeth.

Besides man, they seem to have no other enemy than the white bear, with whom they have terrible combats; but generally come off victorious by means of their great tusks

2. T. dugong. Indian walrus. Tusks in the upper jaw projecting, approximate. Inhabits the sea between the cape of Good Hope and the Philippine Islands; feeds on sea-weeds; its flesh resembles beef.

3. T. manatus. Manate, or manati. Tuskless. This species includes three varieties.

α. Borealis. Whale-tailed manate. Hairless; toeless; clawless.

β. Australis. Round-tailed manate. Fore-feet four or five toed, clawed.

γ. Siren. Sea-ape. Ears erect, sharp-pointed.

The fore-feet of the first, or whale-tailed manate, are little more than pectoral fins; they serve only for swimming, and are never used for walking; for it never goes ashore like the walrus and seal. It brings forth in the water, and, like the whale, suckles its young in that element. Like the whale too, it has a horizontal broad tail, without even the rudiments of hind feet. It inhabits the north-west coast of America, African and American seas.

They live perpetually in the water, and frequent the edges of the shores. In calm weather they swim in great droves near the mouths of rivers. In the time of flood they come so near the land that a person may stroke them with his hand. They live in families, near each other; each family consisting of a male, a female, a half grown young one, and a very small one. The females oblige their young to swim before them, while the other old ones surround and guard them on all sides. The affection between the male and female is very great; for if she be attacked, he will defend her to the utmost; and, if she be killed, will follow her corpse to the very shore, and swim some days near the place it has been landed at. They copulate in the spring; the female brings but one young one at a time, and suckles it by two teats. They are extremely voracious, and when filled, fall asleep on their backs. During their meals they are so intent on their food, generally sea-weeds, that any one may go among them, and choose which he likes best.

Their backs and sides are generally above water; and numbers of gulls are continually perching on them, and picking out a peculiar species of louse, with which their skins are infested. In winter, they are so very lean, that we may count their ribs. When struck with a harpoon, it requires the united strength of thirty men to draw one of them on shore. When a manati is struck, its companions swim to its assistance; some attempt to overturn the boat, others press down the rope to break it, and others strike at the harpoon with their tails, and often succeed in forcing it out.

They are of an enormous size; some are twenty-three feet long, and weigh 8,000 pounds. The head is small, oblong, and almost square; the nostrils are filled with short bristles; the gape is small; the lips double; near the junction of the two jaws the mouth is full of white tubular bristles; the lips are also full of bristles, which serve instead of teeth. In the mouth there are no teeth; only two flat white bones, one in each jaw, with undulated surfaces, which serve in place of grinders. The eyes are extremely small, not larger than those of a sheep; the iris is black: it has no ears, only two very small orifices: the tongue is pointed and small; neck very thick; the head hangs down. The circumference of the body near the shoulders is twelve feet; about the belly twenty; near the tail only four feet eight: the head thirty-one inches; the neck seven feet. Near the shoulders are two feet, or rather fins, which are only two feet two inches long, and have neither fingers nor nails; concave beneath, and covered with hard bristles. The tail is thick, strong, and horizontal, ending in a stiff black fin, like the substance of whalebone.

The skin is very thick, black, and full of inequalities, like the bark of oak. It has no hair on it; but is so hard as scarcely to be cut with an axe. Beneath the skin there is a thick blubber which tastes like oil of almonds. The flesh is coarser than beef, and will not soon putrefy. The young ones taste like veal. The skin is used for shoes, and for covering the sides of boats.

The round-tailed manate has thick lips; eyes as minute as a pea; and two very small orifices for ears. Its neck is short, and thicker than its head: it is thickest at the shoulders, and tapers gradually to the tail, which is quite round, lies horizontally, is thickest in the middle, growing thinner to the edges. The feet are placed at the shoulders; beneath the skin there are bones for five complete toes: near the base of each foot, in the female, is a small teat. The skin is very thick and hard, having some few hairs scattered over it. Dampier measured some of these animals in the West Indies ten or twelve feet long; their tails twenty inches long, fourteen broad. Some of the largest weighed twelve hundred pounds. Clusius examined one sixteen feet and a half long, and Gomora speaks of them of the length of twenty feet.

The manates which entirely inhabit fresh waters, according to Dampier, are much less than the others. Those of the higher parts of the Oronoque weigh only from five hundred to seven hundred and fifty pounds. They inhabit the rivers of Africa, from Senegal to the Cape; and those of South America also. They sometimes live in the sea, near the mouth of some great river; into which they come once or twice in twenty-four hours, for the sake of browzing on the marine plants which grow within their reach. They delight in brackish, or sweet water, rather than in salt, and in shallow water near low land, and in places secure from surges and rapid tides. It is said that at times they frolic and leap to great heights out of the water. They are taken with a harpoon stuck in the end of a staff, which the Indians use with great dexterity. The Spaniards call them fish cows.

The extraordinary history of a tame manate, preserved by a prince of Hispaniola, in a lake adjoining his residence, at the time of the arrival of the Spaniards, deserves to be mentioned. It was, on account of its general nature, called in the language of the country matum. It would appear as soon as it was called by any of its familiars; for it hated the Spaniards, on account of an injury it had received from one of those adventurers. The fable of Arion was here realised. It would offer itself to the Indian favourites, and carry over the lake ten at a time, singing and playing upon its back. Matum at last, however, escaped to its native waters by means of a violent flood.

These animals are easily tamed, grow very fond of music, and are the dolphin tribe of the ancients.

The sea-ape is five feet long, with a head like a dog's; erect and sharp ears; large eyes; a sort of beard on both lips; body round, thickest near the head, tapering to the tail, which is bifurcated; the upper lobe the longest: body covered with thick hair, grey on the back and red on the belly. Mr. Steller, who first noticed it, could discover neither feet nor paws. It is full of frolic, plays a thousand monkey tricks; sometimes swimming on one side, sometimes on the other side of a ship, looking at it seemingly with great amazement. It will come so near the ship that it may be touched with a pole; but if any body stir it immediately retires. It often raises one third of its body above the water, and stands erect for a considerable time: then suddenly darts under the ship, and appears in the same attitude on the other side; and repeats this for thirty times together. It frequently brings up a sea plant, not unlike the bottlegourd, which it tosses about, and catches in its mouth, playing a thousand humorous antics. These seem, also, to be alluded to by the ancients under the name of dolphins. See Nat. Hist. Pl. CLXVIII.

TRICHIA, or TRICHIASIS. (τριχιασις, from τριξ, a hair.) Trichosis. A disease of the eye-lashes, in which they are turned inwards, towards the bulb of the eye.

TRICHILLIA, in botany, a genus of the class decandria, order monogynia. Calyx about five-toothed; petals five; nectary toothed, cylindrical, bearing the anthers in the tip of the teeth; calyx three-celled, three-valved; seed berried. Twelve species; trees of Asia and America.

TRICHIURUS. Trichiure. In zoology, a genus of the class pisces, order apodalia.

Head lengthened; the apertures lateral; teeth ensiform, hooked on one side, the fore-ones larger; gill-membrane seven-rayed; body compressed, ensiform; tail subulate, finless. Two species.

1. T. lepturus. Silver-trichiure. Lower jaw longer than the upper. Inhabits fresh waters of South America; three and a half feet long; is very voracious and swims rapidly; frequently leaps into boats as they pass by; body naked, entirely silvery.

2. T. Indicus. Indian trichiure. Jaws unequal. Inhabits the Indian Ocean: is in a small degree electrical; brown, spotted; has very minute teeth; small, sharp tail.

TRICHIUS, in the entomology of Fabricius, a tribe of the genus Scarabæus, which see.

TRICHOCEPHALUS, in zoology, a genus of the class vermes, order intestina. Body round, elastic, and variously twisted; head, or fore-part, much thicker, and furnished with a slender exsertile proboscis; tail or lower part long, capillary, and tapering to a fine point. Six species: of these,

T. hominis, or long-hair worm, is most worthy of our attention. Body above slightly crenate, beneath smooth, and very finely striate on the fore-part; head obtuse, and furnished with a very slender proboscis, which it can eject or contract at pleasure; tail or thinner part twice as long as the thicker end, end terminating in a fine hair-likepoint.

This isthe trichuris vulgaris of medical writers: it inhabits the intestines of sickly children, generally the cœcum, and in considerable numbers; it is about two inches long, and in colour resembles an ascaris.

The rest are found to inhabit the intestines of the horse, of the boar, of the fox, of the mouse, and of various lizards; and their specific names are derived from the animal they infest. The largest is that of the horse, trichocephalus equi: it measures two inches and a half in length.

TRICHODA, in zoology, a genus of the class vermes, order infusoria. Worm invisible, pellucid, hairy, or horned. Sixty species; thus subdivided:

A. Hairy.

B. Furnished with cirri, the himantopus of Adams.

C. Horned: the kerona of Adams.

These microscopical worms are found of almost all shapes, spherical, oval, cylindrical, flattish, hooded, boat-formed, square, in waters and infusions of almost all kinds; fresh-water, stagnant water, marsh-water, sea-water; in some species a minute pellucid globule alone, in others a globule with a minuter globule, or a variety of bright molecules attached; in others again with divergent rays of hairs, or glittering horns, issuing from the front or other directions. See Nat. Hist. Pl. CLXXXV.

TRICHOMA. (τριχωμα, from τριχες, the hair.) The plaited hair. See Plica polonica.

TRICHOMANES, in botany, a genus of the class cryptogamia, order filices. Fructification crowded, in somewhat exserted, marginal dots, seated on a small column, within the cup-shaped, one-leaved involucre, which opens outwardly. Twenty-eight species, all exotic. A few with simple, the greater number with compound frond, except the two following.

1. T. pyxidiferus. Cup trichomanes. Tripinnatifid, pointed with linear, obtuse segments. Found among stones in wet grounds.

2. T. Tunbrigensis. Tunbridge trichomanes. Pinnated, dichotomous, decurrent. Found in the fissures of moist rocks in Wales and Scotland.

TRICHONEMA, in botany, a genus of the class and order triandria, monogynia. Corol turbinate-patent; anthers subbreviate on the filament; stigmas recurvately exserted just below their tops. Four species, T. emiciatum, caulescens, roseum, and pudicum: the corols of all which agree in every respect except the colour. The most beautiful is the second, which is a native of the Cape of Good Hope, whence it was imported by Messrs. Lea and Kennedy, of Hammersmith. See Botany, Pl. CLXXVII.

TRICHOSANTHES, in botany, a genus of the class monœcia, order triandria. Male: calyx five-toothed; corol five-parted, ciliate; filaments three; anthers cylindrical. Fem.: calyx five-toothed; corol five-parted, ciliate; styles three-cleft; some oblong, three-celled. Seven species; one a native of St. Domingo, the rest of the East Indies. The chief of these is trichosanthes anguina, snake-gourd, a Chinese annual, with round, oblong, incurved fruit; occasionally found in our own gardens.

TRICHOSTEMA, in botany, a genus of the class didynamia, order gymnospermia. Corol with the upper lip falcated; stamens very long. Two species, natives of North America: trichostema dichotoma, with long stamens, and blue flowers: trichostema brachiata, the stamens short, included in the corol.

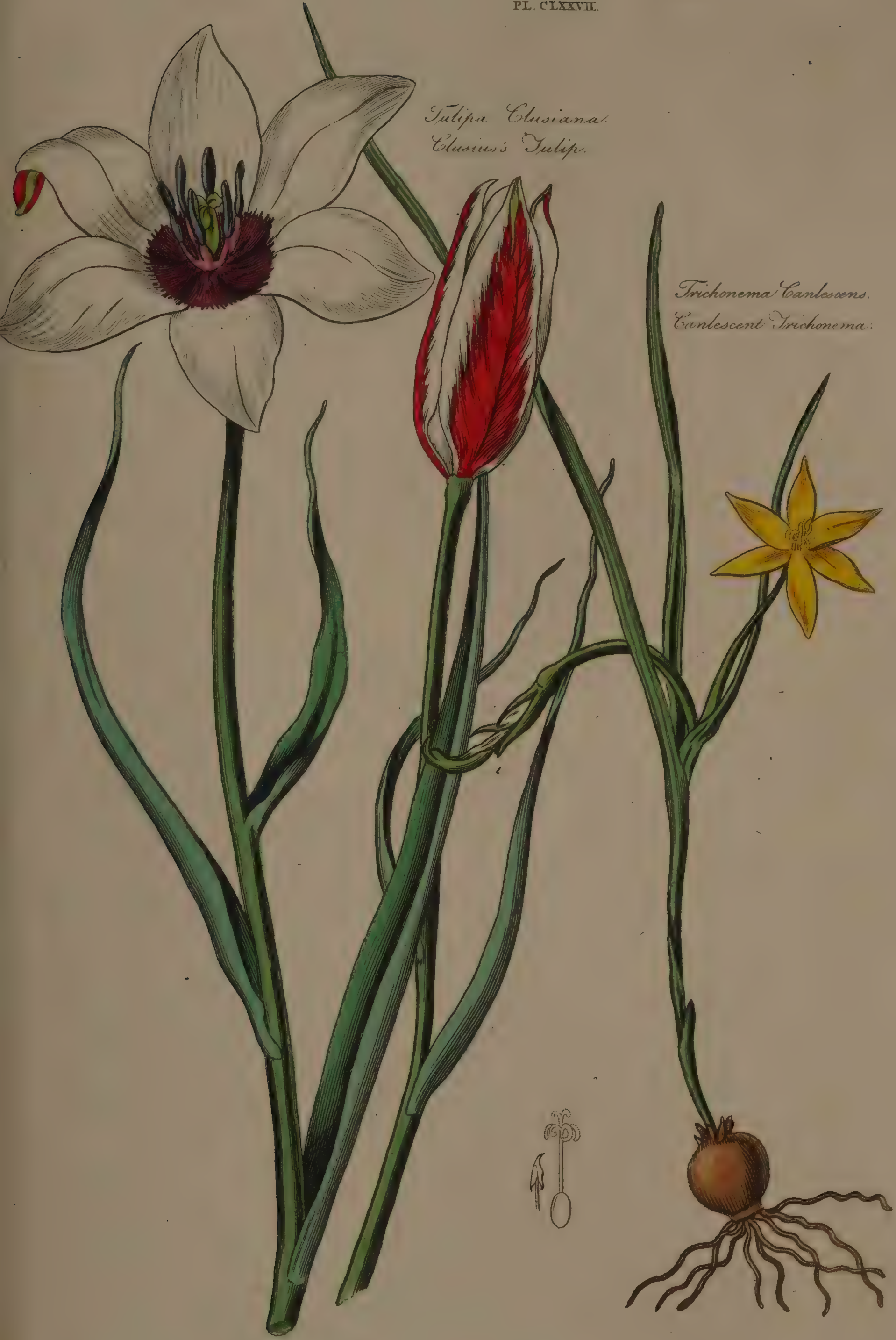
TRICHOSTOMUM, in botany, a genus of the class cryptogamia, order musci. Capsule oblong; fringe simple, of thirty-two filiform teeth, standing together in pairs, or united in pairs at the base. Twenty-five species; in about half, the teeth of the fringe unconnected at the base; in the rest connected. Nineteen are natives of our own country.

TRICHO'TOMY. *s.* (τριχοτομεω.) Division into three parts (*Watts*).

TRICHURIS. (τριχυρις, from τριξ, a hair.) The long hair-worm, or tricocephalus hominis of the Linnéan system.

See Tricocephalus, Invermination, and Worms.

TRICK. *s.* (*treck*, Dutch.) 1. A sly fraud (*Raleigh*). 2. A dexterous artifice (*Pope*). 3. A vicious practice (*Dryden*). 4. A juggle; an antic; any thing done to cheat jocosely, or to divert (*Prior*). 5. An unexpected effect (*Shakspeare*). 6. A practice; a manner; a habit: not in use (*Shakspeare*). 7. A number of cards laid regularly up in play.



Tulipa Clusiana.
Clusius's Tulip.

Trichonema Caulescens.
Caulescent Trichonema.

London, Published by Sherwood & Co. Paternoster Row, Sepr. 1st 1812.

To TRICK. *v. a.* (from the noun: *tricher*, French.) 1. To cheat; to impose on; to defraud (*Stephens*). 2. To dress; to decorate; to adorn; properly, to knot (*Sandys*). 3. To perform by slight of hand, or with a light touch (*Pope*).

To TRICK. *v. n.* To live by fraud (*Dryden*).

TRI′CKER. *s.* (often written *trigger.*) The catch which being pulled disengages the cock of the gun, that it may give fire (*Boyle*).

TRI′CKING. *s.* (from *trick.*) Dress; ornament (*Shakspeare*).

TRI′CKISH. *a.* (from *trick.*) Knavishly artful; fraudulently cunning; mischievously subtle (*Pope*).

To TRI′CKLE. *v. n.* To fall in drops; to rill in a slender stream (*Pope*).

TRI′CKSY. *a.* (from *trick.*) Pretty. This is a word of endearment (*Shakspeare*).

TRICOCARPUS, in botany, a genus of the class polyandria, order monogynia. Calyx four or five-parted; corolless; styles two, cloven; capsule bristly, one-celled, four-valved, many-seeded. One species; a tree of Guiana, with scattered, oblong, entire leaves; lateral corymbs.

TRICOCCÆ, the name of the forty-seventh order in Linnéus's Fragments, and of the thirty-eighth in his Natural Orders.

TRICOCCOUS or THREE-GRAINED CAPSULE. Tricocca capsula. In botany, swelling out into three protuberances, internally divided into three cells, with one seed in each: as in euphorbia.

TRICOLOR, in botany. See AMARANTHUS and VIOLA.

TRICO′RPORAL. *a.* (*tricorpus*, Latin.) Having three bodies.

TRICRATUS, in botany, a genus of the class pentandria, order monogynia. Corol funnel-form, with a five-parted border; the segments two-lobed; nectary cup-shaped, surrounding the germ; stamens inserted in the nectary and adhering closely to the tube; calyxless; nut five-angled, one-seeded. One species only, a California herb, with diffuse branches; opposite, entire, ovate leaves; flowers in heads on long peduncles and involucred.

TRICUSPID VALVES. (*valvulæ tricuspides*, from *tres*, three, and *cuspis*, a point; so called from their being three-pointed.) In anatomy, the name of the three valves situated at the origin of the aorta and pulmonary artery.

TRICUSPIDATE STAMEN, a three-pointed stamen, as in some species of allium. See CUSPIDATE.

TRIDAX, in botany, a genus of the class syngenesia, order polygamia superflua. Receptacle chaffy; down many-rayed, simple; calyx imbricate, cylindrical; florets of the ray three-parted. One species; an herbaceous plant of Vera Cruz, procumbent, hairy, with flowers peduncled, terminal, whitish copper-yellow.

TRIDE, in the manage, a word signifying short and swift. A tride pace is producing short and swift motions, though united and easy. A horse is said to work tride upon volts when the times he marks with his haunches are short and ready. Some apply the word only to the motion of the haunches.

TRIDENT, an attribute of Neptune, being a kind of sceptre which the painters and poets put into the hands of that god, in form of a spear or fork with three teeth: whence the word.

TRIDENT, in the higher geometry, a curve expressed by the equation $xy = ax^3 + bx^2 + cx + d$. The figure has four infinite legs; of which two are hyperbolic about one asymptote, tending towards contrary parts; and two, converging parabolic legs, making with the former nearly the figure of a trident. This is the Cartesian parabola, by which equations of six dimensions are sometimes constructed: it is the 66th species of Newton's enumeration of lines of the third order.

TRI′DENT. *a.* Having three teeth.

TRI′DING. *s.* (ꞇꞃiðinᵹa, Saxon; rather *trithing.*) The third part of a county or shire. This division is used only in Yorkshire, where it is corrupted into *riding*.

TRI′DUAN. *a.* (from *triduum*, Latin.) 1. Lasting three days. 2. Happening every third day.

TRIE′NNIAL. *a.* (*triennis*, Lat. *triennal*, French.) 1. Lasting three years (*K. Charles*). 2. Happening every third year.

TRIENTALIS. Chickweed. Winter-green. In botany, a genus of the class heptandria, order monogynia. Calyx seven-leaved; corol seven-parted, equal; berry one-celled, juiceless. One species, trientalis Europæa, common to our own woods, with stem simple, leafy at the top; leaves clustered, lanceolate, very entire; peduncles terminal, aggregate, one-flowered: the flowers white.

TRI′ER. *s.* (from *try.*) 1. One who tries experimentally (*Boyle*). 2. One who examines judicially (*Hale*). 3. Test; one who brings to the test (*Shakspeare*).

TRIESTE, a small, but strong and ancient seaport of Italy, in Istria, on the gulf of Venice, with a bishop's see. It is beautifully situated on the side of a hill, about which the vineyards form a semicircle. The streets are narrow; but there is a large square, where they keep the annual fair. The harbour is spacious, but not good; because it is open to the W. and S.W. winds. The inhabitants have a good trade in salt, oil, almonds, iron, &c. brought from Laubach; and they make good wines. The cathedral, and the late Jesuits church, are the two best buildings. It belongs to the house of Austria, and is eight miles north of Capo d'Istria, and eighty north-east of Venice. Lon. 14. 4 E. Lat. 45. 56 N.

To TRI′FALLOW. *v. a.* (*tres*, Latin, and ꝼealᵹa, Sax. a harrow.) To plow land the third time before sowing (*Mortimer*).

TRI′FID. *a.* (among botanists.) Cut or divided into three parts (*Bailey*).

TRIFI′STULARY. *a.* (*tres* and *fistula*, Lat.) Having three pipes (*Brown*).

To TRI′FLE. *v. n.* (*tryfelen*, Dutch.) 1. To act or talk without weight or dignity; to act with levity; to talk with folly (*Hooker*). 2. To mock; to play the fool (*Shakspeare*). 3. To indulge light amusement (*Law*). 4. To be of no importance (*Spenser*).

To TRI′FLE. *v. a.* To make of no importance: not in use (*Shakspeare*).

TRI′FLE. *s.* (from the verb.) A thing of no moment (*Drayton*).

TRI′FLER. *s.* (*trifelaar*, Dutch.) One who acts with levity, or talks with folly (*Watts*).

TRI′FLING. *a.* (from *trifle*.) Wanting worth; unimportant; wanting weight (*Rogers*).

TRI′FLINGLY. *ad.* Without weight; without dignity; without importance (*Locke*).

TRIFLOROUS PEDUNCLE, a three-flowered peduncle. Bearing three flowers.

TRIFO′LIATE. *a.* (*tres* and *folium*, Lat.) Having three leaves (*Harte*).

TRIFOLIUM. Trefoil. Clover. In botany, a genus of the class diadelphia, order decandria. Flowers more or less in heads; legume hardly longer than the calyx, never bursting, but falling off entire. Seventy-two species, chiefly natives of Europe and Asia.

They are thus subdivided:

A. Legumes naked, many-seeded: flowers racemed.

B. Legumes covered, many-seeded: distinguished by the name lotoidea, or lotus-shaped.

C. Calyxes mostly villous: the tribe lagopoda.

D. Calyx inflated, swelling: the tribe vesicaria.

E. Banners of the corol inflected: the tribe lupulina.

Of these seventeen or eighteen are natives of Britain. We shall specifically notice a few; and refer our readers to the article HUSBANDRY for the detail of their mode of cultivation and comparative advantages.

1. T. officinale. Melilot. Legumes racemed, naked, two-seeded, wrinkled, acute; stipules lance-subulate, undivided: stem erect. Found wild in our brakes; and formerly employed in medicine as an emollient, under the name of MELILOTUS, which see.

2. T. repens. White or Dutch clover. Heads umbellar; legumes four-seeded; upper teeth of the calyx shorter; leaflets ovate-oblong, emarginate, serrulate; stem creeping. Indigenous to our pastures; and an excellent fodder for cattle.

3. T. pratense. Red clover. Spikes dense, ovate; lowest tooth of the calyx shorter than the tube of the corol; corol one-petalled, unequal; stipules awned; leaflets oval, mostly entire; stem ascending. Chiefly cultivated as food for cattle, and indigenous to our meadows.

4. T. alpestre. Long-leaved, purple trefoil; or mountain clover. Spikes dense, nearly globular, mostly in pairs; lowest tooth of the calyx shorter than the tube of the corol; corol one-petalled, nearly equal; stipules setaceous; leaflets lanceolate, very finely serrulate, striate with veins; stems quite simple, stiff. Found wild on the European continent, but not supposed to be a native of Britain.

5. T. procumbens. Hop clover. Spikes oval, imbricate; banners deflected, permanent, grooved; stems procumbent; leaflets obovate. Found wild in our pastures.

TRIFOLIUM ODORATUM. See MELILOTUS.

TRIFOLIUM PALUDOSUM. (from *tres*, three, and *folium*, a leaf; so called because it has three leaves on each stalk.) Trifolium aquaticum. Trifolium fibrinum. Menyanthes. Water trefoil, or buck-bean. Menyanthes trifoliata of Linnéus. Menyanthes foliis ternatis. C. O. pentandria, monogynia. The whole plant is so extremely bitter, that in some countries it is used as a substitute for hops, in the preparation of malt liquor. It is sometimes employed in country places as an active eccoprotic bitter in hydropic and rheumatic affections. Cases are related of its good effects in some cutaneous diseases of the herpetic and seemingly cancerous kind.

TRI′FORM. *a.* (*triformis*, Latin.) Having a triple shape (*Milton*).

TRIGEMINI, in anatomy. (*trigeminus*, from *tres*, three, and *geminus*, double; three times double.) The fifth pair of nerves, which arise from the crura of the cerebellum, and are divided within the cavity of the cranium into three branches, viz. the orbital, superior, and inferior maxillary. The orbital branch is divided into the frontal, lachrymal, and nasal nerves; the superior maxillary into the sphæno-palatine, posterior alveolar, and infra-orbital nerves; and the inferior maxillary into two branches, the internal lingual, and one more properly called the inferior maxillary.

TRI′GGER. *s.* (derived by *Junius* from *trigue*, Fr. from *intricare*, Lat.) 1. A catch to hold the wheel on steep ground. 2. The catch that being pulled looses the cock of the gun (*Locke*).

TRIGI′NTALS. *s.* (from *triginta*, Latin, *thirty*.) A number of masses to the tale of thirty, instituted by St. Gregory (*Ayliffe*).

TRIGLA. Gurnard. In zoology, a genus of the class pisces, order thoracica. Head large, mailed, with rough lines; eyes large, round, vertical; mouth large; palate and jaws armed with sharp teeth; nostrils double; gill-cover of a single, radiate, spinous piece; the membrane seven-rayed; body wedged, coated with small scales; back straight, with a longitudinal, spinous groove on each side; lateral line straight, nearer the back; belly thick; ventral and pectoral fins large, the latter with articulate appendages situated before them. Fourteen species: scattered through the seas of the globe, chiefly those of northern Europe; five frequenting our own coasts. We shall notice a few specimens.

1. T. evolans. Flying gurnard. Appendages three; between the dorsal fins three serrate spines; snout notched; pectoral fins black, half as long as the body; the first and

second spines of the first dorsal fin and the first of the second rough on the anterior side; tail bifid. Inhabits Carolina and South America.

2. T. volitans. Fluttering gurnard. Appendages twenty; webbed by an intervening membrane. Inhabits the Mediterranean and Asiatic seas, and between the tropics.

Both these species possess somewhat of the faculty of the exocœtus, limited in the same, or perhaps in a greater degree, and employed for the same purpose, that of enabling them to escape from the numerous enemies that beset them. It is curious in the intra-tropical regions to behold some thousands of these fishes all darting from their native element to avoid the pursuit of the dolphin below, and often falling into the power of enemies still more dexterous and inveterate in the aereal element. The flights of these ambiguous animals are but short; for as soon as their wings dry, they drop back into the subjacent waves without a possibility of rising till they are again wetted. It is from the sudden exsiccation of their wings that they often fall upon the decks of vessels, particularly those that are doubling the Cape of Good Hope. These fishes are seen in the Mediterranean, but seldom venture farther from the line; none of those that frequent the British seas are capable of rising from their native element.

3. T. gurnardus. Grey gurnard. Appendages three; back with black and red spots. Below the lateral line, which is remarkably rough, the colours are more diluted, and the white spots more frequent; till they reach the belly, which is silvery. The head is large, covered with bony plates, which run backwards, and terminates in two sharp horns or spines. The snout, and upper part of the eyes, are also fortified in the same manner by spines. The jaws, and the whole inner part of the mouth, are covered with very small teeth. The eyes are large; the irids of a silver colour, with a tincture of brown; nostrils small, and placed on the sides of the rostrum: on the extremity of the gill covers is a thick, sharp, and long spine. The first dorsal fin consists of eight spiny rays; the sides of the first three tuberculated: the second has nineteen rays, and is lodged, like the former, in a groove, rough on each side. The pectoral fins are long and transparent, and supported by ten rays; from their base hang three beards.

This species inhabits the seas of Europe, and is found on our own coasts: from two and a half to three feet long; feeds on crabs and testaceous animals; flesh very good.

4. T. lyra. Piper. Appendages three; nostrils tubular. Inhabits the British coasts; nearly two feet long, and an excellent fish for the table.

5. T. cuculus. Red or cuckow gurnard. Appendages three; lateral line unarmed. Inhabits the British coasts, and the seas of Europe generally; a foot long; body slender, red, dotted with black, beneath silvery: is very voracious.

6. T. hirundo. Tub-fish. Sapphirine gurnard. Appendages three; lateral line prickly; pectoral fins pale green, edged and spotted with rich blue. Inhabits the British and Northern seas; from two to three pounds weight; body above greenish-brown, the sides tinged with red, below silvery; feeds on small fishes and crabs, and swims swiftly.

7. T. Adriatica. Body verticillate, with scales; lateral line prickly; pectoral fins beneath black; appendages three. Inhabits the Adriatic; a span long; body red, with black spots and bands, beneath whitish.

TRIGLOCHIN. Arrow-grass. In botany, a genus of the class hexandria, order trigynia. Calyx three-leaved; petals three, resembling the calyx; styleless; capsules superior, bursting at the base; seeds solitary. Four species; the two following common to our own country.

1. T. palustre. Capsules three-celled, smooth, linear, tapering to the base; root fibrous. Wild in our wet meadows.

2. T. maritimum. Capsules six-celled, grooved, ovate. Wild on our salt marshes. Both are eaten by cattle.

TRIGLYPH, in architecture, is a member of the Doric frize, placed directly over each column, and at equal distances in the intercolumniation, having two entire glyphs or channels engraven in it, meeting in an angle, and separated by three legs from the two demichannels of the sides.

TRIGON, a figure of three angles, or a triangle.

TRIGON, in astrology. See TRIPLICITY.

TRIGON, in astronomy, denotes an aspect of two planets when they are 120 degrees distant from each other; called also a trine, being the third part of 360 degrees.—The trigons of Mars and Saturn are by astrologers held malific or malignant aspects.

TRIGON, in dialling, is an instrument of a triangular form.

TRIGON, in music, denoted a musical instrument, used among the ancients. It was a kind of triangular lyre, or harp, invented by Ibycus; and was used at feasts, being played on by women, who struck it either with a quill, or beat it with small rods of different lengths and weights, to occasion a diversity in the sounds.

TRIGONAL. *a.* (from *trigon.*) Triangular; having three corners (*Woodward*).

TRIGONELLA, in botany, a genus of the class diadelphia, order decandria. Banner and wings nearly equal, spreading, resembling a three-petalled corol. Seventeen species; natives of Asia, Africa, and the south of Europe: of these the chief is trigonella fœnugræcum, fenugreek, with legumes sessile, stiff, nearly erect, somewhat falcate, pointed; stem erect. It is a native of Montpellier; and its farina is still used medicinally in the composition of cataplasms, under the name of FŒNUGRÆCUM, which see.

TRIGONIA, in botany, a genus of the class diadelphia, order decandria. Calyx five-parted; banner with a hollow at the base on the inside; nectary two scales at the base of the germ; some of the filaments barren; capsule leguminous, three-sided, three-celled, three-valved. Two species; natives of Cayenne and Guiana.

TRIGONOMETRY. (τριγωνος and μετρον.) The art of measuring the sides and angles of triangles, either plane or spherical, whence it is accordingly called either Plane Trigonometry, or Spherical Trigonometry.

Trigonometry is an art of the greatest use in the mathematical sciences, especially in astronomy, navigation, surveying, dialing, geography, &c. &c. By it we come to know the magnitude of the earth, the planets and stars, their distances, motions, eclipses, and almost all other useful arts and sciences. Accordingly we find this art has been cultivated from the earliest ages of mathematical knowledge.

Trigonometry, or the resolution of triangles, is founded on the mutual proportions which subsist between the sides and angles of triangles; which proportions are known by finding the relations between the radius of a circle and certain other lines drawn in and about the circle, called cords, sines, tangents, and secants. The ancients, Menelaus, Hipparchus, Ptolemy, &c. performed their trigonometry by means of the cords. As to the sines, and the common theorems relating to them, they were introduced into trigonometry by the Moors or Arabians, from whom this art passed into Europe, with several other branches of science. The Europeans have introduced, since the 15th century, the tangents and secants, with the theorems relating to them.

The proportion of the sines, tangents, &c. to their radius, is sometimes expressed in common or natural numbers, which constitute what we call the tables of natural sines, tangents, and secants. Sometimes it is expressed in logarithms, being the logarithms of the said natural sines, tangents, &c. and these constitute the table of artificial sines, &c. Lastly, sometimes the proportion is not expressed in numbers; but the several sines, tangents, &c. are actually laid down upon lines of scales; whence the line of sines, of tangents, &c.

In trigonometry, as angles are measured by arcs of a circle described about the angular point, so the whole circumference of the circle is divided into a great number of parts; as 360 degrees, and each degree into 60 minutes, and each minute into 60 seconds, &c.; and then any angle is said to consist of so many degrees, minutes, and seconds, as are contained in the arc that measures the angle, or that is intercepted between the legs or sides of the angle.

Now the sine, tangent, and secant, &c. of every degree and minute, &c. of a quadrant, are calculated to the radius 1, and ranged in tables for use; as also the logarithms of the same; forming the triangular canon. And these numbers, so arranged in tables, form every species of right-angled triangles; so that no such triangle can be proposed, but one similar to it may be there found, by comparison with which the proposed one may be computed by analogy or proportion.

PLANE TRIGONOMETRY CONSIDERED ANALYTICALLY.

Art. 1. There are two methods which are adopted by mathematicians in investigating the theory of trigonometry: the one geometrical, the other algebraical. In the former, the various relations of the sines, cosines, tangents, &c. of single or multiple arcs or angles, and those of the sides and angles of triangles, are deduced immediately from the figures to which the several enquiries are referred; each individual case requiring its own particular method, and resting on evidence peculiar to itself. In the latter, the nature and properties of the linear-angular quantities (sines, tangents, &c.) being first defined, some general relation of these quantities, or of them in connection with a triangle, is expressed by one or more algebraical equations; and then every other theorem or precept, of use in this branch of science, is developed by the simple reduction and transformation of the primitive equation. Thus, the rules for the three fundamental cases in plane trigonometry, which may be deduced by three independent geometrical investigations, are obtained algebraically, by forming, between the three data and the three unknown quantities, three equations, and obtaining, in expressions of known terms, the value of each of the unknown quantities, the others being exterminated by the usual processes. Each of these general methods has its peculiar advantages. The geometrical method carries conviction at every step; and by keeping the objects of enquiry constantly before the eye of the student, serves admirably to guard him against the admission of error: the algebraical method, on the contrary, requiring little aid from first principles, but merely at the commencement of its career, is more properly mechanical than mental, and requires frequent checks to prevent any deviation from truth. The geometrical method is direct, and rapid, in producing the requisite conclusions at the outset of trigonometrical science; but slow and circuitous in arriving at those results which the modern state of the science requires: while the algebraical method, though sometimes circuitous in the development of the mere elementary theorems, is very rapid and fertile in producing those curious and interesting formulæ, which are wanted in the higher branches of pure analysis, and in mixed mathematics, especially in physical astronomy. This mode of developing the theory of trigonometry is, consequently, well suited for the use of the more advanced student: and is therefore introduced here with as much brevity as is consistent with its nature and utility.

2. To save the trouble of turning very frequently to other articles, a few of the principal definitions are here repeated, as follows:

The sine of an arc is the perpendicular let fall from one of its extremities upon the diameter of the circle which passes through the other extremity.

The cosine of an arc, is the sine of the complement of that arc, and is equal to the part of the radius comprised between the centre of the circle and the foot of the sine.

The tangent of an arc, is a line which touches the circle in one extremity of that arc, and is continued from thence till it meets a line drawn from or through the centre and through the other extremity of the arc.

The secant of an arc, is the radius drawn through one of the extremities of that arc and prolonged till it meets the tangent drawn from the other extremity.

The versed sine of an arc, is that part of the diameter of the circle which lies between the beginning of the arc and the foot of the sine.

The cotangent, cosecant, and coversed sine of an arc, are the tangent, secant, and versed sine, of the complement of such arc.

3. Since arcs are proper and adequate measures of plane angles, (the ratio of any two plane angles being constantly equal to the ratio of the two arcs of any circle whose centre is the angular point, and which are intercepted by the lines whose inclinations form the angle), it is usual, and it is perfectly safe, to apply the above names without circumlocution as though they referred to the angles themselves; thus, when we speak of the sine, tangent, or secant, of an angle, we mean the sine, tangent, or secant, of the arc which measures that angle; the radius of the circle employed being known.

4. The tangent is a fourth proportional to the cosine, sine, and radius; the secant, a third proportional to the cosine and radius; the cotangent, a fourth proportional to the sine, cosine, and radius; and the cosecant a third proportional to the sine and radius. Hence, making use of the obvious abbreviations, and converting the analogies into equations, we have

$$\text{tan.} = \frac{\text{rad.} \times \text{sine.}}{\text{cos.}},\ \text{cot.} = \frac{\text{rad.} \times \text{cos.}}{\text{sine}},\ \text{sec.} = \frac{\text{rad}^2.}{\text{cos.}},\ \text{cos.} = \frac{\text{rad}^2.}{\text{sine}}.$$

Or, assuming unity for the rad. of the circle, these will become

$$\text{tan.} = \frac{\text{sin.}}{\text{cos.}} \ldots \text{cot.} = \frac{\text{cos.}}{\text{sin.}} \ldots \text{sec.} = \frac{1}{\text{cos.}} \ldots \text{cos.} = \frac{1}{\text{sin.}}.$$

These preliminaries being borne in mind, the student may pursue his investigations.

5. Let ABC, fig. 8. pl. 170. be any plane triangle, of which the side BC opposite the angle A is denoted by the small letter a, the side AC opposite the angle B by the small letter b, and the side AB opposite the angle C by the small letter c, and CD perpendicular to AB: then is, $c = a\,.\,\text{cos. B} + b\,.\,\text{cos. A}$.

For, since AC $= b$, AD is the cosine of A to that radius; consequently, supposing radius to be unity, we have AD $= b$, cos. A. In like manner it is BD $= a$. cos. B. Therefore, AD + BD = AB $= c = a\,.\,\text{cos. B} + b\,.\,\text{cos. A}$. By pursuing similar reasoning with respect to the other two sides of the triangle, exactly analogous results will be obtained. Placed together, they will be as below:

$$\left.\begin{aligned} a &= b\,.\,\text{cos. C} + c\,.\,\text{cos. B} \\ b &= a\,.\,\text{cos. C} + c\,.\,\text{cos. A} \\ c &= a\,.\,\text{cos. B} + b\,.\,\text{cos. A} \end{aligned}\right\}\ \text{(I.)}$$

6. Now, if from these equations it were required to find expressions for the angles of a plane triangle, when the sides are given; we have only to multiply the first of these equations by a, the second by b, the third by c, and to subtract each of the equations thus obtained from the sum of the other two. For thus we shall have

$$\left.\begin{aligned} b^2 + c^2 - a^2 &= 2bc\,.\,\text{cos. A, whence cos. A} = \frac{b^2 + c^2 - a^2}{2bc} \\ a^2 + c^2 - b^2 &= 2ac\,.\,\text{cos. B}, \ldots\ \text{cos. B} = \frac{a^2 + c^2 - b^2}{2ac} \\ a^2 + b^2 - c^2 &= 2ab\,.\,\text{cos. C}, \ldots\ \text{cos. C} = \frac{a^2 + b^2 - c^2}{2ab} \end{aligned}\right\}\ \text{(II.)}$$

7. More convenient expressions than these will be deduced hereafter: but even these will often be found very convenient, when the sides of triangles are expressed in integers, and tables of sines and tangents, as well as a table of squares, are at hand.

Suppose, for example, the sides of the triangle are $a = 320$, $b = 562$, $c = 800$, then we have

$b^2 + c^2 - a^2 = 853444$ . . . . . log. = 5·9311751
$2bc$ . . = 899200 . . . . . log. = 5·9538080
The remainder being log. cos. A, or of 18°20′ = 9·9773671
Again, $a^2 + c^2 - b^2 = 426556$ . . . log. = 5·6299760
$2ac$ . . . = 512000 . . . log. = 5·7092700
The remainder being log. cos. B, or of 33°35′ = 9 9207060

Then 180° − (18° 20′ + 33° 35′) = 128° 5′ = C: where all the three angles are determined in 7 lines.

8. If it were wished to get expressions for the sines, instead of the cosines, of the angles; it would merely be necessary to introduce into the preceding equations (marked II), instead of cos. A, cos. B, &c. their equivalents cos. A $= \sqrt{(1 - \text{sin}^2.\,\text{A})}$, cos. B $= \sqrt{(1 - \text{sin}^2.\,\text{B})}$, &c. For then, after a little reduction, there would result,

$$\left.\begin{aligned} \text{sin. A} &= \frac{1}{2bc}\sqrt{2a^2b^2 + 2a^2c^2 + 2b^2c^2 - (a^4 + b^4 + c^4)} \\ \text{sin. B} &= \frac{1}{2ac}\sqrt{2a^2b^2 + 2a^2c^2 + 2b^2c^2 - (a^4 + b^4 + c^4)} \\ \text{sin. C} &= \frac{1}{2ab}\sqrt{2a^2b^2 + 2a^2c^2 + 2b^2c^2 - (a^4 + b^4 + c^4)} \end{aligned}\right\}$$

Or, resolving the expression under the radical into its four constituent factors, substituting s for $a + b + c$, and reducing, the equations will become

$$\left.\begin{aligned}\sin. A &= \frac{2}{bc}\sqrt{\tfrac{1}{2}s\left(\tfrac{1}{2}s-a\right)\left(\tfrac{1}{2}s-b\right)\left(\tfrac{1}{2}s-c\right)}\\ \sin. B &= \frac{2}{ac}\sqrt{\tfrac{1}{2}s\left(\tfrac{1}{2}s-a\right)\left(\tfrac{1}{2}s-b\right)\left(\tfrac{1}{2}s-c\right)}\\ \sin. C &= \frac{2}{ab}\sqrt{\tfrac{1}{2}s\left(\tfrac{1}{2}s-a\right)\left(\tfrac{1}{2}s-b\right)\left(\tfrac{1}{2}s-c\right)}\end{aligned}\right\}\text{(III).}$$

These equations are moderately well suited for computation in their latter form; they are also perfectly symmetrical: and as indeed the quantities under the radical are identical, and are constituted of known terms, the value of the root may be represented by the same character; suppose K: then shall we have

$$\sin. A = \frac{2K}{bc}\;\ldots\;\sin. B = \frac{2K}{ac}\;\ldots\;\sin. C = \frac{2K}{ab}\;\ldots\;(iii.)$$

Hence we may immediately deduce a very important theorem: for, the first of these equations, divided by the second, gives $\frac{\sin. A}{\sin. B} = \frac{a}{b}$, and the first divided by the third gives $\frac{\sin. A}{\sin. C} = \frac{a}{c}$: whence we have

$$\sin. A : \sin. B : \sin. C \propto a : b : c \;\ldots\text{(IV.)}$$

Or, in words, the sides of plane triangles are proportional to the sines of their opposite angles.

9. Before the remainder of the theorems, necessary in the solution of plane triangles, are investigated, the fundamental proposition in the theory of sines, &c. must be deduced, and the method explained by which tables of these quantities, confined within the limits of the quadrant, are made to extend to the whole circle, or to any number of quadrants whatever. In order to this, expressions must be first obtained for the sines, cosines, &c. of the sums and differences of any two arcs or angles. Now, it has been found (1) that $a = b . \cos. C + c . \cos. B$. And the equations (IV) give $b = a . \frac{\sin. B}{\sin. A} \;\ldots\; c = a . \frac{\sin. C}{\sin. A}$. Substituting these values of b and c for them in the preceding equation, and multiplying the whole by $\frac{\sin. A}{a}$, it will become

$$\sin. A = \sin. B . \cos. C + \sin. C . \cos. B.$$

But, in every plane triangle, the sum of the three angles is two right angles; therefore, B and C are equal to the supplement of A: and, consequently, since an angle and its supplement have the same sine (see art. SINE), we have $\sin. (B + C) = \sin. B . \cos. C + \sin. C . \cos. B$.

10. If, in the last equation, C become subtractive, then would $\sin. C$ manifestly become subtractive also, while the cosine of C would not change its sign, since it would still continue to be estimated on the same radius in the same direction. Hence the preceding equation would become

$$\sin. (B - C) = \sin. B . \cos. C - \sin. C . \cos. B.$$

11. Let C' be the complement of C, and $\frac{1}{4}O$ be the quarter of the circumference: then will $C' = \frac{1}{4}O - C$, $\sin. C' = \cos. C$, and $\cos. C' = \sin. C$. But (art. 10), $\sin. (B - C') = \sin. B . \cos. C' - \sin. C'$ $\cos. B$. Therefore, substituting for $\sin. C'$, $\cos. C'$, their values, there will result $\sin. (B - C') = \sin. B . \sin. C - \cos. B . \cos. C$. But because $C' = \frac{1}{4}O - C$, we have $\sin. (B - C') = \sin. (B + C - \frac{1}{4}O) = \sin [(B + C) - \frac{1}{4}O] = -\sin. [\frac{1}{4}O - (B + C)] = -\cos. (B + C)$. Substituting this value of $\sin. (B - C')$ in the equation above, it becomes $\cos. (B + C) = \cos. B . \cos. C - \sin. B . \sin. C$.

12. In this latter equation, if C be made subtractive, $\sin. C$ will become $-\sin. C$, while $\cos. C$ will not change: consequently the equation will be transformed to the following, viz. $\cos. (B - C) = \cos. B . \cos. C + \sin. B . \sin. C$.

If, instead of the angles B and C, the angles had been A and B; or, if A and B represented the arcs which measure those angles, the results would evidently be similar: they may therefore be expressed generally by the two following equations, for the sines and cosines of the sums or differences of any two arcs or angles:

$$\left.\begin{aligned}\sin. (A \pm B) &= \sin. A . \cos. B \pm \sin. B . \cos. A.\\ \cos. (A \pm B) &= \cos. A . \cos. B \mp \sin. A . \sin. B.\end{aligned}\right\}\text{(V).}$$

13. We are now in a state to trace completely the mutations of the sines, cosines, &c. as they relate to arcs in the various parts of a circle; and thence to perceive that tables which apparently are included within a quadrant, are, in fact, applicable to the whole circle.

Imagine that the radius MC of the circle, in fig. 9. pl. 170, coinciding at first with AC, turns about the point C (in the same manner as a rod would turn on a pivot), and thus forming successively with AC all possible angles: the point M at its extremity passing over all the points of the circumference $ABA'B'A$, or describing the whole circle. Tracing this motion attentively, it will appear, that at the point A, where the arc is nothing, the sine is nothing also, while the cosine does not differ from the radius. As the radius MC recedes from AC, the sine PM keeps increasing, and the cosine CP decreasing, till the describing point M has passed over a quadrant, and arrived at B: in that case, PM becomes equal to CB the radius, and the cosine CP vanishes. The point M continuing its motion beyond B, the sine $P'M'$ will diminish, while the cosine CP', which now falls on the contrary side of the centre C will increase. In the figure, $P'M'$ and CP' are respectively the sine and cosine of the arc $A'M'$, or the sine and cosine of ABM', which is the supplement of $A'M'$ to $\frac{1}{2}O$, half the circumference: whence it follows that an obtuse angle (measured by an arc greater than a quadrant) has the same sine and cosine as its supplement; the cosine, however, being reckoned subtractive or negative, because it is situated contrariwise with regard to the centre C.

When the describing point M has passed over $\frac{1}{2}O$, or half the circumference, and has arrived at A', the sine $P'M'$ vanishes, or becomes nothing, as at the point A, and the cosine is again equal to the radius of the circle. Here the angle ACM has attained its maximum limit; but the radius CM may still be supposed to continue its motion, and pass below the diameter AA'. The sine, which will then be $P''M''$, will consequently fall below the diameter, and will augment as M moves along the third quadrant, while on the contrary CP'', the cosine, will diminish. In this quadrant too, both sine and cosine must be considered as negative; the former being on a contrary side of the diameter, the latter a contrary side of the centre, to what each was respectively in the first quadrant. At the point B', where the arc is three-fourths of the circumference, or $\frac{3}{4}O$, the sine $P''M''$ becomes equal to the radius CB, and the cosine CP'' vanishes. Finally, in the fourth quadrant, from B' to A, the sine $P'''M'''$, always below AA', diminishes in its progress, while the cosine CP''', which is then found on the same side of the centre as it was in the first quadrant, augments till it becomes equal to the radius CA. Hence, the sine in this quadrant is to be considered as negative or subtractive, the cosine as positive. If the motion of M were continued through the circumference again, the circumstances would be exactly the same in the fifth quadrant as in the first, in the sixth as in the second, in the seventh as in the third, in the eighth as in the fourth: and the like would be the case in any subsequent revolutions.

14. If the mutations of the tangent be traced in like manner, it will be seen that its magnitude passes from nothing to infinity in the first quadrant; becomes negative, and decreases from infinity to nothing in the second; becomes positive again, and increases from nothing to infinity in the third quadrant; and lastly, becomes negative again, and decreases from infinity to nothing, in the fourth quadrant.

15. These conclusions admit of a ready confirmation, and others may be deduced, by means of the analytical expressions in arts. 4 and 12. Thus, if A be supposed equal to $\frac{1}{4}O$, in equa. V, it will become

$$\cos.\ (\tfrac{1}{4}O \pm B) = \cos.\ \tfrac{1}{4}O\ .\ \cos.\ B \mp \sin.\ \tfrac{1}{4}O\ .\ \sin.\ B,$$
$$\sin.\ (\tfrac{1}{4}O \pm B) = \sin.\ \tfrac{1}{4}O\ .\ \cos.\ B \pm \sin.\ B\ .\ \cos.\ \tfrac{1}{4}O.$$

But $\sin.\ \frac{1}{4}O = \text{rad.} = 1$; and, $\cos.\ \frac{1}{4}O = 0$: so that the above equations will become

$$\cos.\ (\tfrac{1}{4}O \pm B) = \mp \sin.\ B.$$
$$\sin.\ (\tfrac{1}{4}O \pm B) = \cos.\ B.$$

From which it is obvious, that if the sine and cosine of an arc, less than a quadrant, be regarded as positive, the cosine of an arc greater than $\frac{1}{4}O$ and less than $\frac{1}{2}O$ will be negative, but its sine positive. If B also be made $= \frac{1}{4}O$; then shall we have $\cos.\ \frac{1}{2}O = -1$; $\sin.\ \frac{1}{2}O = 0$.

Suppose next, that in the equa. V, $A = \frac{1}{2}O$; then shall we obtain

$$\cos.\ (\tfrac{1}{2}O \pm B) = -\cos.\ B.$$
$$\sin.\ (\tfrac{1}{2}O \pm B) = \mp \sin.\ B;$$

which indicates, that every arc comprised between $\frac{1}{2}O$ and $\frac{3}{4}O$, or that terminates in the third quadrant, will have its sine and its cosine both negative. In this case too, when $B = \frac{1}{4}O$, or the arc terminates at the end of the third quadrant, we shall have $\cos.\ \frac{3}{4}O = 0$, $\sin.\ \frac{3}{4}O = -1$.

Lastly, the case remains to be considered in which $A = \frac{3}{4}O$, or in which the arc terminates in the fourth quadrant. Here the primitive equations (V) give

$$\cos.\ (\tfrac{3}{4}O \pm B) = \pm \sin.\ B.$$
$$\sin.\ (\tfrac{3}{4}O \pm B) = -\cos.\ B;$$

so that in all arcs between $\frac{3}{4}O$ and O, the cosines are positive and the sines negative.

16. The changes of the tangents, with regard to positive and negative, may be traced by the application of the preceding results to the algebraic expression for the tangent; viz. $\tan. = \frac{\sin.}{\cos.}$. For it is hence manifest, that when the sine and cosine are either both positive or both negative, the tangent will be positive; which will be the case in the first and third quadrants. But when the sine and cosine have different signs, the tangents will be negative, as in the second and fourth quadrants. The algebraic expression for the cotangent, viz. $\cot. = \frac{\cos.}{\sin.}$, will produce exactly the same results.

The expressions for the secants and cosecants, viz. $\sec. = \frac{1}{\cos.}$, $\text{cosec.} = \frac{1}{\sin.}$ show, that the signs of the secants are the same as those of the cosines; and those of the cosecants the same as those of the sines.

The magnitude of the tangent at the end of the first and third quadrants will be infinite; because in those places the sine is equal to radius, the cosine equal to zero, and therefore $\frac{\sin.}{\cos.} = \infty$ (infinity). Of these, however, the former will be reckoned positive, the latter negative.

17. The magnitudes of the cotangents, secants, and cosecants, may be traced in like manner; and the results of the 13th, 14th, and 15th articles, recapitulated and tabulated as below.

	0°	90°	180°	270°	360°
Sin.	0	R	0	− R	0
Tan	0	∞	0	− ∞	0
Sec.	R	∞	− R	− ∞	R
Cos.	R	0	− R	0	R
Cot.	∞	0	− ∞	0	∞
Cosec.	∞	R	− ∞	− R	∞

(VI.)

The changes of signs are these:

quadrants				sin.	cos.	tan.	cot.	sec.	cosec.
1st.	5th.	9th.	13th.	+	+	+	+	+	+
2d.	6th.	10th.	14th.	+	−	−	−	−	+
3d.	7th.	11th.	15th.	−	−	+	+	−	−
4th.	8th.	12th.	16th.	−	+	−	−	+	−

(VII.)

We have been thus particular in tracing the mutations, both with regard to value and algebraic signs, of the principal trigonometrical quantities, because a knowledge of them is absolutely necessary in the application of trigonometry to the solution of equations, and to various astronomical and physical problems.

18. We may now proceed to the investigation of other expressions relating to the sums, differences, multiples, &c. of arcs; and in order that these expressions may have the more generality, give to the radius any value R, instead of confining it to unity. This indeed may always be done in an expression, however complex, by merely rendering all the terms homogeneous; that is, by multiplying each term by such a power of R as shall make it of the same dimension, as the term in the equation which has the highest dimension. Thus, the expression for a triple arc

$$\sin.\ 3A = 3\ \sin.\ A - 4\ \sin^3.\ A \quad (\text{radius} = 1)$$

becomes when radius is assumed $= R$,

$$R^2\ \sin.\ 3A = R^2\ 3\ \sin.\ A - 4\ \sin^3.\ A$$

$$\text{or } \sin.\ 3A = \frac{3R^2\ \sin.\ A - 4\ \sin^3.\ A}{R^2}.$$

Hence then, if consistently with this precept, R be placed for a denominator of the second member of each equation V, (art. 12), and if A be supposed equal to B, we shall have

$$\sin.\ (A + A) = \frac{\sin.\ A\ .\ \cos.\ A + \sin.\ A\ .\ \cos.\ A}{R}.$$

$$\text{That is, } \sin.\ 2A = \frac{2\ \sin.\ A\ .\ \cos.\ A}{R}.$$

And, in like manner, by supposing B to become successively equal to 2A, 3A, 4A, &c. there will arise

$$\left.\begin{aligned}
\sin.\, 3A &= \frac{\sin. A . \cos. 2A + \cos. A . \sin. 2A}{R}\\
\sin.\, 4A &= \frac{\sin. A . \cos. 3A + \cos. A . \sin. 3A}{R}\\
\sin.\, 5A &= \frac{\sin. A . \cos. 4A + \cos. A . \sin. 4A}{R}
\end{aligned}\right\}\text{(VIII.)}$$

And, by similar processes, the second of the equations just referred to, namely, that for cos. $(A+B)$, will give successively,

$$\left.\begin{aligned}
\cos.\, 2A &= \frac{\cos^2. A - \sin^2. A}{R}\\
\cos.\, 3A &= \frac{\cos. A . \cos. 2A - \sin. A . \sin. 2A}{R}\\
\cos.\, 4A &= \frac{\cos. A . \cos. 3A - \sin. A . \sin. 3A}{R}\\
\cos.\, 5A &= \frac{\cos. A . \cos. 4A - \sin. A . \sin. 4A}{R}
\end{aligned}\right\}\text{(IX).}$$

19. If, in the expressions for the successive multiples of the sines, the values of the several cosines in terms of the sines were substituted for them; and a like process were adopted with regard to the multiples of the cosines, other expressions would be obtained, in which the multiple sines would be expressed in terms of the radius and sine, and the multiple cosines in terms of the radius and cosine.

$$\left.\begin{aligned}
\text{As } \sin.\, A &= s\\
\sin.\, 2A &= 2s\sqrt{R^2-s^2}\\
\sin.\, 3A &= 3s-4s^3\\
\sin.\, 4A &= (4s-8s^3)\sqrt{R^2-s^2}\\
\sin.\, 5A &= 5s-20s^3+16s^5\\
\sin.\, 6A &= (6s-32s^3+32s^5)\sqrt{R^2-s^2}\\
&\&c.\ \&c.
\end{aligned}\right\}\text{(X.)}$$

$$\left.\begin{aligned}
\cos.\, A &= c\\
\cos.\, 2A &= 2c^2-1\\
\cos.\, 3A &= 4c^3-3c\\
\cos.\, 4A &= 8c^4-8c^2+1\\
\cos.\, 5A &= 16c^5-20c^3+5c\\
\cos.\, 6A &= 32c^6-48c^4+18c^2-1\\
&\&c.\ \&c.
\end{aligned}\right\}\text{(XI.)}$$

Other very convenient expressions for multiple arcs may be obtained thus:

Add together the expanded expressions for sin. $(B+A)$, sin. $(B-A)$, that is,

$$\begin{array}{ll}
\text{add} & \sin.\,(B+A) = \sin. B . \cos. A + \cos. B . \sin. A,\\
\text{to} & \sin.\,(B-A) = \sin. B . \cos. A - \cos. B . \sin. A;\\
\text{there results} & \sin.\,(B+A) + \sin.\,(B-A) = 2\cos. A . \sin. B:\\
\text{whence} & \sin.\,(B+A) = 2\cos. A . \sin. B - \sin.\,(B-A).
\end{array}$$

Thus again, by adding together the expressions for cos. $(B+A)$ and cos. $(B-A)$, we have

$$\cos.\,(B+A) + \cos.\,(B-A) = 2\cos. A . \cos. B;$$

whence, $\cos.\,(B+A) = 2\cos. A . \cos. B - \cos.\,(B-A)$. Substituting in these expressions for the sine and cosine of $B+A$, the successive values A, $2A$, $3A$, &c. instead of B; the following series will be produced.

$$\left.\begin{aligned}
\sin.\, 2A &= 2\cos. A . \sin. A.\\
\sin.\, 3A &= 2\cos. A . \sin. 2A - \sin. A.\\
\sin.\, 4A &= 2\cos. A . \sin. 3A - \sin. 2A.\\
\sin.\, nA &= 2\cos. A . \sin. (n-1)A - \sin. (n-2)A.
\end{aligned}\right\}(x.)$$

$$\left.\begin{aligned}
\cos.\, 2A &= 2\cos. A . \cos. A - \cos. 0 (= 1).\\
\cos.\, 3A &= 2\cos. A . \cos. 2A - \cos. A.\\
\cos.\, 4A &= 2\cos. A . \cos. 3A - \cos. 2A.\\
\cos.\, nA &= 2\cos. A . \cos. (n-1)A - \cos. (n-2)A.
\end{aligned}\right\}(xi.)$$

Several other expressions for the sines and cosines of multiple arcs, might readily be found: but the above are the most useful and commodious.

20. From the equation $\sin.\, 2A = \frac{2\sin. A . \cos. A}{R}$ it will be easy, when the sine of an arc is known, to find that of its half. For, substituting for cos. A its value $\sqrt{(R^2-\sin^2 A)}$, there will arise $\sin.\, 2A = \frac{2\sin. A \sqrt{(R^2-\sin^2. A)}}{R}$. This squared

gives $R^2 \sin^2. 2A = 4R^2 \sin^2. A - 4\sin^4. A$.

Here taking sin. A for the unknown quantity, we have a quadratic equation, which solved after the usual manner, gives

$$\sin.\, A = \pm\sqrt{\tfrac{1}{2}R^2 \pm \tfrac{1}{2}R\sqrt{R^2-\sin^2. 2A}}.$$

If we make $2A = A'$, then will $A = \frac{1}{2}A'$, and consequently the last equation becomes

$$\left.\begin{aligned}
&\sin.\, \tfrac{1}{2}A' = \pm\sqrt{\tfrac{1}{2}R^2 \pm \tfrac{1}{2}R\sqrt{R^2-\sin^2. A'}}\\
&\text{or } \sin.\, \tfrac{1}{2}A' = \pm\tfrac{1}{2}\sqrt{2R^2 \pm 2R\cos. A'}:
\end{aligned}\right\}\text{(XII.)}$$

by putting cos. A' for its value $\sqrt{R^2-\sin^2. A'}$, multiplying the quantities under the radical by 4, and dividing the whole second number by 2. Both these expressions for the sine of half an arc or angle will be of use to us as we proceed.

21. If the values of sin. $(A+B)$ and sine $(A-B)$, given by equa. V, be added together, there will result

$$\sin.\,(A+B) + \sin.\,(A-B) = \frac{2\sin. A . \cos. B}{R}; \text{ whence,}$$

$$\sin. A . \cos. B = \tfrac{1}{2}R \sin.\,(A+B) + \tfrac{1}{2}R \sin.\,(A-B)$$

(XIII.)

Also, taking sin. $(A-B)$ from sin. $(A+B)$, gives

$$\sin.\,(A+B) - \sin.\,(A-B) = \frac{2\sin. B . \cos. A}{R};$$

whence,

$$\sin. B . \cos. A = \tfrac{1}{2}R \sin.\,(A+B) - \tfrac{1}{2}R . \sin.\,(A-B)$$

(XIV.)

When $A=B$, both equa. XIII and XIV, become

$$\cos. A . \sin. A = \tfrac{1}{2}R \sin. 2A .. \text{(XV.)}$$

22. In like manner, by adding together the primitive expressions for cos. $(A+B)$, cos. $(A-B)$, there will arise

$$\cos.\,(A+B) + \cos.\,(A-B) = \frac{2\cos. A . \cos. B}{R};$$

whence,

$$\cos. A . \cos. B = \tfrac{1}{2}R . \cos.\,(A+B) + \tfrac{1}{2}R . \cos.\,(A-B)$$

(XVI.)

And here, when $A=B$, recollecting that when the arc is nothing the cosine is equal to radius, we shall have

$$\cos^2. A = \tfrac{1}{2}R . \cos. 2A + \tfrac{1}{2}R^2 \ldots \text{(XVII.)}$$

23. Deducting cos. $(A+B)$ from cos. $(A-B)$, there will remain

$$\cos.\,(A-B) - \cos.\,(A+B) = \frac{2\sin. A . \sin. B}{R}; \text{ whence,}$$

$$\sin. A . \sin. B = \tfrac{1}{2}R . \cos\,(A-B) - \tfrac{1}{2}R . \cos.\,(A+B)$$

(XVIII.)

When $A=B$, this formula becomes

$$\sin^2. A = \tfrac{1}{2}R^2 - \tfrac{1}{2}R . \cos. 2A \ldots \text{(XIX.)}$$

24. Multiplying together the expressions for sin. $(A+B)$ and sin. $(A-B)$, equa. V, and reducing, there results

$$\sin.\,(A+B) . \sin.\,(A-B) = \sin^2. A - \sin^2. B.$$

And, in like manner, multiplying together the values of $\text{cos. }(A+B)$ and $\text{cos. }(A-B)$, there is produced

$$\text{cos. }(A+B)\,.\,\text{cos. }(A-B)=\text{cos}^2.\,A-\text{cos}^2.\,B.$$

Here, since $\text{sin}^2.\,A-\text{sin}^2.\,B$, is equal to $(\text{sin. }A+\text{sin. }B)\times(\text{sin. }A-\text{sin. }B)$, that is, to the rectangle of the sum and difference of the sines; it follows, that the first of these equations converted into an analogy, becomes

$\text{sin. }(A-B):\text{sin. }A-\text{sin. }B::\text{sin. }A+\text{sin. }B:\text{sin. }(A+B)\ .\ .\ \text{(XX.)}$

That is to say, the sine of the difference of any two arcs or angles, is to the difference of their sines, as the sum of those sines is to the sine of their sum.

If A and B be to each other as $n+1$ to n, then the preceding proportion will be converted into

$\text{sin. }A:\text{sin. }(n+1)\,A-\text{sin. }nA::\text{sin. }(n+1)\,A+\text{sin. }nA:\text{sin. }(2n+1)\,A.\ .\ .\ .\ \text{(XXI.)}$

These two proportions are highly useful in computing a table of sines; as will be shown in the practical examples in the sequel.

25. Let us suppose $A+B=A'$, and $A-B=B'$; then the half sum and the half difference of these equations will give respectively $A=\tfrac{1}{2}(A'+B')$, and $B=\tfrac{1}{2}(A'-B')$. Putting these values of A and B, in the expressions of $\text{sin. }A\,.\,\text{cos. }B$, $\text{sin. }B\,.\,\text{cos. }A$, $\text{cos. }A\,.\,\text{cos. }B$, $\text{sin. }A\,.\,\text{sin. }B$, obtained in arts. 21, 22, 23, there would arise the following formulæ:

$$\begin{aligned}
\text{sin. }\tfrac{1}{2}(A'+B')\,.\,\text{cos. }\tfrac{1}{2}(A'-B')&=\tfrac{1}{2}R\,(\text{sin. }A'+\text{sin. }B'),\\
\text{sin. }\tfrac{1}{2}(A'-B')\,.\,\text{cos. }\tfrac{1}{2}(A'+B')&=\tfrac{1}{2}R\,(\text{sin. }A'-\text{sin. }B'),\\
\text{cos. }\tfrac{1}{2}(A+B')\,.\,\text{cos. }\tfrac{1}{2}(A'-B')&=\tfrac{1}{2}R\,(\text{cos. }A'+\text{cos. }B'),\\
\text{sin. }\tfrac{1}{2}(A'+B')\,.\,\text{sin. }\tfrac{1}{2}(A'-B')&=\tfrac{1}{2}R\,(\text{cos. }B'-\text{cos. }A').
\end{aligned}$$

Dividing the second of these formulæ by the first, there will be had

$$\frac{\text{sin. }\tfrac{1}{2}(A'-B')\,.\,\text{cos. }\tfrac{1}{2}(A'+B')}{\text{sin. }\tfrac{1}{2}(A'+B')\,.\,\text{cos. }\tfrac{1}{2}(A'-B')}=\frac{\text{sin. }\tfrac{1}{2}(A'-B')}{\text{cos. }\tfrac{1}{2}(A'-B')}\,.\,\frac{\text{cos. }\tfrac{1}{2}(A'+B')}{\text{sin. }\tfrac{1}{2}(A'+B')}=\frac{\text{sin. }A'-\text{sin. }B'}{\text{sin. }A'+\text{sin. }B'}.$$

But since $\frac{\text{sin.}}{\text{cos.}}=\frac{\text{tan.}}{R}$, and $\frac{\text{cos.}}{\text{sin.}}=\frac{R}{\text{tan.}}$, it follows, that the two factors of the first member of this equation, are $\frac{\text{tan. }\tfrac{1}{2}(A'-B')}{R}$, and $\frac{R}{\text{tan. }\tfrac{1}{2}(A'+B')}$, respectively; so that the equation manifestly becomes

$$\frac{\text{tan. }\tfrac{1}{2}(A'-B')}{\text{tan. }\tfrac{1}{2}(A'+B')}=\frac{\text{sin. }A'-\text{sin. }B'}{\text{sin. }A'+\text{sin. }B'}.\ \text{(XXII.)}$$

This equation is readily converted into a very useful proportion, viz. the sum of the sines of two arcs or angles, is to their difference, as the tangent of half the sum of those arcs or angles, is to the tangent of half their difference.

26. Operating with the third and fourth formulæ of the preceding article, as we have already done with the first and second, we shall obtain

$$\frac{\text{tan. }\tfrac{1}{2}(A'+B')\,.\,\text{tan. }\tfrac{1}{2}(A'-B')}{R^2}=\frac{\text{cos. }B'-\text{cos. }A'}{\text{cos. }A'+\text{cos. }B'}.$$

In like manner, we have by division,

$$\frac{\text{sin. }A'+\text{sin. }B'}{\text{cos. }A'+\text{cos. }B'}=\frac{\text{sin. }\tfrac{1}{2}(A'+B')}{\text{cos. }\tfrac{1}{2}(A'+B')}=\text{tan. }\tfrac{1}{2}(A'+B');$$

$$\frac{\text{sin. }A'+\text{sin. }B'}{\text{cos. }B'-\text{cos. }A'}=\text{cot. }\tfrac{1}{2}(A'-B');\ \frac{\text{sin. }A'-\text{sin. }B'}{\text{cos. }A'+\text{cos. }B'}$$

$$=\text{tan. }\tfrac{1}{2}(A'-B')\,.\,.\,\frac{\text{sin. }A'-\text{sin. }B'}{\text{cos. }B'-\text{cos. }A'}=\text{cot. }\tfrac{1}{2}(A'+B'),$$

$$\frac{\text{cos. }A'+\text{cos. }B'}{\text{cos. }B'-\text{cos. }A'}=\frac{\text{cot. }\tfrac{1}{2}(A'+B')}{\text{tan. }\tfrac{1}{2}(A'-B')}.$$

Making $B=0$, in one or other of these expressions, there results,

$$\left.\begin{aligned}
\frac{\text{sin. }A'}{1+\text{cos. }A'}&=\text{tan. }\tfrac{1}{2}A'=\frac{1}{\text{cot. }\tfrac{1}{2}A'}.\\
\frac{\text{sin. }A'}{1-\text{cos. }A'}&=\text{cot. }\tfrac{1}{2}A'=\frac{1}{\text{tan. }\tfrac{1}{2}A'}.\\
\frac{1+\text{cos. }A'}{1-\text{cos. }A'}&=\frac{\text{cot. }\tfrac{1}{2}A'}{\text{tan. }\tfrac{1}{2}A'}=\text{cot}^2.\,\tfrac{1}{2}A'=\frac{1}{\text{tan}^2.\,\tfrac{1}{2}A'}.
\end{aligned}\right\}\textit{(xxii.)}$$

These theorems will find their application in some of the investigations of spherical trigonometry.

27. Once more, dividing the expression for $\text{sin. }(A\pm B)$ by that for $\text{cos. }(A\pm B)$, there results

$$\frac{\text{sin. }(A\pm B)}{\text{cos. }(A\pm B)}=\frac{\text{sin. }A\,.\,\text{cos. }B\pm\text{sin. }B\,.\,\text{cos. }A}{\text{cos. }A\,.\,\text{cos. }B\mp\text{sin. }A\,.\,\text{sin. }B}:$$

then dividing both numerator and denominator of the second fraction, by $\text{cos. }A\,.\,\text{cos. }B$, and recollecting that $\frac{\text{sin.}}{\text{cos.}}=\frac{\text{tan.}}{R}$, we shall thus obtain

$$\frac{\text{tan. }(A\pm B)}{R}=\frac{R\,(\text{tan. }A\pm\text{tan. }B)}{R^2\mp\text{tan. }A\,.\,\text{tan. }B};$$

or, lastly, $\text{tan. }(A\pm B)=\dfrac{R^2(\text{tan. }A\pm\text{tan. }B)}{R^2\mp\text{tan. }A\,.\,\text{tan. }B}.\text{(XXIII.)}$

Also, since $\text{cot.}=\frac{R^2}{\text{tan.}}$, we shall have

$$\text{cot. }(A\pm B)=\frac{R^2}{\text{tan. }(A\pm B)}=\frac{R^2\mp\text{tan. }A\,.\,\text{tan. }B}{\text{tan. }A\pm\text{tan. }B};$$

which, after a little reduction, becomes

$$\text{cot. }(A\pm B)=\frac{\text{cot. }A\,.\,\text{cot. }B\mp R^2}{\text{cot. }B\pm\text{cot. }A}.\ .\ .\ .\ .\ \text{(XXIV.)}$$

28. We might now proceed to deduce expressions for the tangents, cotangents, secants, &c. of multiple arcs, as well as some of the usual formulæ of verification in the construction of tables, such as

$\text{sin. }(54^\circ+A)+\text{sin. }(54^\circ-A)-\text{sin. }(18^\circ+A)-\text{sin. }(18^\circ-A)=\text{sin. }(90^\circ-A)$; $\text{sin. }A+\text{sin. }(36^\circ-A)+\text{sin. }(72^\circ+A)=\text{sin. }(36^\circ+A)+\text{sin. }(72^\circ-A)$.

&c. &c.

But, as these enquiries would extend this article to too great a length, we shall pass them by; and merely investigate a few properties where more than two arcs or angles are concerned, and which may be of use in various mathematical enquiries.

29. Let A, B, C, be any three arcs or angles, and suppose radius to be unity; then

$$\text{sin. }(B+C)=\frac{\text{sin. }A\,.\,\text{sin. }C+\text{sin. }B\,.\,\text{sin. }(A+B+C)}{\text{sin. }(A+B)}.$$

For, by equa. v, $\text{sin. }(A+B+C)=\text{sin. }A\,.\,\text{cos. }(B+C)+\text{cos. }A\,.\,\text{sin. }(B+C)$, which, (putting $\text{cos. }B\,.\,\text{cos. }C-\text{sin. }B\,.\,\text{sin. }C$ for $\text{cos. }(B+C)$), is $=\text{sin. }A\,.\,\text{cos. }B\,.\,\text{cos. }C-\text{sin. }A\,.\,\text{sin. }B\,.\,\text{sin. }C+\text{cos. }A\,.\,\text{sin. }(B+C)$; and, multiplying by $\text{sin. }B$, and adding $\text{sin. }A\,.\,\text{sin. }C$, there results $\text{sin. }A\,.\,\text{sin. }C+\text{sin. }B\,.\,\text{sin. }(A+B+C)=\text{sin. }A\,.\,\text{cos. }B\,.\,\text{cos. }C\,.\,\text{sin. }B+\text{sin. }A\,.\,\text{sin. }C\,.\,\text{cos}^2.\,B+\text{cos. }A\,.\,\text{sin. }B\,.\,\text{sin. }(B+C)=\text{sin. }A\,.\,\text{cos. }B\,.\,(\text{sin. }B\,.\,\text{cos. }C+\text{cos. }B\,.$

$\sin. C) + \cos. A . \sin. B . \sin. (B + C) = \sin. A . \cos. B . \sin. (B + C) + \cos. A . \sin. A . \sin. (B + C) = (\sin. A . \cos. B + \cos. A . \sin. B) \times \sin. (B + C) = \sin. (A + B) . \sin. (B + C)$. Consequently, by dividing by $\sin. (A + B)$, we obtain the expression above given.

In a similar manner it may be shown, that

$$\sin. (B - C) = \frac{\sin. A . \sin. C - \sin. B . \sin. (A - B + C)}{\sin. (A - B)}.$$

30. If A, B, C, D, represent four arcs or angles, then writing $C + D$ for C in the preceding investigation, there will result,

$$\sin. (B + C + D) = \frac{\sin. A . \sin. (C + D) + \sin. B . \sin. (A + B + C + D)}{\sin. (A + B)}.$$

A like process for five arcs or angles will give

$$\sin. (B + C + D + E) = \frac{\sin. A . \sin. (C + D + E) + \sin. B . \sin. (A + B + C + D + E)}{\sin. (A + B)}.$$

And for any number, A, B, C, &c. to L,

$$\sin. (B + C + \ldots L) = \frac{\sin. A . \sin. (C + D + \ldots L) + \sin. B . \sin. (A + B + C + \ldots L)}{\sin. (A + B)}.$$

31. Taking again the three A, B, C, we have

$\sin. (B - C) = \sin. B . \cos. C - \sin. C . \cos. B,$
$\sin. (C - A) = \sin. C . \cos. A - \sin. A . \cos. C,$
$\sin. (A - B) = \sin. A . \cos. B - \sin. B . \cos. A.$

Multiplying the first of these equations by $\sin. A$, the second by $\sin. B$, the third by $\sin. C$; then adding together the equations thus transformed, and reducing; there will result,

$$\sin. A . \sin. (B - C) + \sin. B . \sin. (C - A) + \sin. C . \sin. (A - B) = 0,$$
$$\cos. A . \sin. (B - C) + \cos. B . \sin. (C - A) + \cos. C . \sin. (A - B) = 0.$$

These two equations obtained for any three angles whatever, apply evidently to the three angles of any triangle.

32. Let the series of arcs or angles A, B, C, D, ... L, be contemplated, then we have (art. 24),

$\sin. (A + B) . \sin. (A - B) = \sin^2. A - \sin^2. B,$
$\sin. (B + C) . \sin. (B - C) = \sin^2. B - \sin^2. C,$
$\sin. (C + D) . \sin. (C - D) = \sin^2. C - \sin^2. D,$
&c. &c. &c.
$\sin. (L + A) . \sin. (L - A) = \sin^2. L - \sin^2. A.$

If all these equations be added together, the second member of the equation will vanish, and of consequence we shall have

$\sin. (A + B) . \sin. (A - B) + \sin. (B + C) . \sin. (B - C) + \&c. \ldots + \sin. (L + A) + \sin. (L - A) = 0.$

Proceeding in a similar manner with $\sin. (A - B)$, $\cos. (A + B)$, $\sin. (B - C)$, $\cos. (B + C)$, &c. there will at length be obtained

$\cos. (A + B) . \sin. (A - B) + \cos. (B + C) . \sin. (B - C) + \&c. \ldots + \cos. (L + A) . \sin. (L - A) = 0.$

33. If the arcs A, B, C, &c.... L form an arithmetical progression, of which the first term is 0, the common difference D', and the last term L any number n of circumferences; then will $B - A = D'$, $C - B = D'$, &c. $A + B = D'$, $B + C = 3D'$, &c.: and dividing the whole by $\sin. D'$, the preceding equations will become

$$\left.\begin{array}{l} \sin. D' + \sin. 3D' + \sin. 5D' + \&c. = 0, \\ \cos. D' + \cos. 3D' + \cos. 5D' + \&c. = 0. \end{array}\right\} \text{(XXV.)}$$

If E' were equal $2D'$, these equations would become

$$\sin. D' + \sin. (D' + E') + \sin. (D' + 2E') + \sin. (D' + 3E') + \&c. = 0,$$
$$\cos. D' + \cos. (D' + E') + \cos. (D' + 2E') + \cos. (D' + 3E') + \&c. = 0.$$

34. The last equation, however, only shows the sums of sines and cosines of arcs or angles in arithmetical progression, when the common difference is to the first term in the ratio of 2 to 1. To investigate a general expression for an infinite series of this kind, let

$s = \sin. A + \sin. (A + B) + \sin. (A + 2B) + \sin. (A + 3B) + \&c.$

Then, since this series is a recurring series, whose scale of relation is $2 \cos. B - 1$, it will arise from the development of a fraction whose denominator is $1 - 2z . \cos. B + z^2$, making $z = 1$. Now this fraction will be

$$= \frac{\sin. A + z [\sin. (A + B) - 2 \sin. A . \cos. B]}{1 - 2z . \cos. B + z^2}.$$

Therefore, when $z = 1$, we have

$$s = \frac{\sin. A + \sin. (A + B) - 2 \sin. A . \cos. B}{2 - 2 \cos. B};$$

and this, because $2 \sin. A . \cos. B = \sin. (A + B) + \sin. (A - B)$ (art. 21), is equal to $\frac{\sin. A - \sin. (A - B)}{2 (1 - \cos. B)}$.

But, since $\sin. A' - \sin. B' = 2 \cos. \frac{1}{2} (A' + B'), \sin. \frac{1}{2} (A' - B')$, by art. 25, it follows, that $\sin. A - \sin. (A - B) = 2 \cos. (A - \frac{1}{2}B) \sin. \frac{1}{2}B$; besides which, we have $1 - \cos. B = 2 \sin^2. \frac{1}{2}B$. Consequently the preceding expression becomes $s = \sin. A + \sin. (A + B) + \sin. (A + 2B) + \sin. (A + 3B) + \&c.$ ad infinitum $= \frac{\cos. (A - \frac{1}{2}B)}{2 \sin. \frac{1}{2}B} \ldots$ (XXVI.)

35. To find the sum of $n + 1$ terms of this series, we have simply to consider that the sum of the terms past the $(n + 1)$th, that is, the sum of $\sin. [A + (n + 1) B] + \sin. [A + (n + 2) B] + \sin. [A + (n + 3) B] + \&c.$ ad infinitum, is, by the preceding theorem, $= \frac{\cos. [A + (n + \frac{1}{2}) B]}{2 \sin. \frac{1}{2}B}$. Deducting this, therefore, from the former expression, there will remain, $\sin. A + \sin. (A + B) + \sin. (A + 2B) + \sin. (A + 3B) + \ldots \sin. (A + nB) =$

$$\frac{\cos. (A - \frac{1}{2}B) - \cos. [A + (n + \frac{1}{2}) B]}{2 \sin. \frac{1}{2}B} = \frac{\sin. (A + \frac{1}{2}nB) . \sin. \frac{1}{2} (n + 1) B}{\sin. \frac{1}{2}B} \ldots \text{(XXVII.)}$$

By like means it will be found, that the sums of the cosines of arcs or angles in arithmetical progression, will be $\cos. A + \cos. (A + B) + \cos. (A + 2B) + \cos. (A + 3B) + \&c.$ ad infinitum $= -\frac{\sin. (A - \frac{1}{2}B)}{2 \sin. \frac{1}{2}B}$. (XXVIII.)

Also,

$\cos. A + \cos. (A + B) + \cos. (A + 2B) + \cos. (A + 3B) +$

$$\ldots.(\cos.\,A+nB)=\frac{\cos.\,(A+\frac{1}{2}nB)\,.\,\sin.\,\frac{1}{2}(n+1)B}{\sin.\,\frac{1}{2}B}.$$

(XXIX.)

36. With regard to the tangents of more than two arcs, the following property (the only one we shall here deduce) is a very curious one, which has not yet been inserted in works of trigonometry, though it has been long known to mathematicians. Let the three arcs A, B, C, together make up the whole circumference, O: then, since $\tan.\,(A+B)=\dfrac{R^2\,(\tan.\,A+\tan.\,B)}{R^2-\tan.\,A\,.\,\tan.\,B}$ (by equation XXIII), we have $R^2\times(\tan.\,A+\tan.\,B+\tan.\,C)=R^2\times[\tan.\,A+\tan.\,B-\tan.\,(A+B)]=R^2\times\left(\tan.\,A+\tan.\,B-\dfrac{R^2(\tan.\,A+\tan.\,B)}{R^2-\tan.\,A\,.\,\tan.\,B}\right)=$, by actual multiplication and reduction, to $\tan.\,A\,.\,\tan.\,B\,.\,\tan.\,C$, since $\tan.\,C=\tan.\,[O-(A+B)]=-\tan.\,(A+B)=-\dfrac{R^2\,(\tan.\,A+\tan.\,B)}{R^2-\tan.\,A\,.\,\tan.\,B}$, by what has preceded in this article. The result therefore is, that the sum of the tangents of any three arcs which together constitute a circle, multiplied by the square of the radius, is equal to the product of those tangents.... (XXX.)

Since both arcs in the second and fourth quadrants have their tangents considered negative, the above property will apply to arcs any way trisecting a semicircle; and it will therefore apply to the angles of a plane triangle, which are, together, measured by arcs constituting a semicircle. So that, if radius be considered as unity, we shall find that, the sum of the tangents of the three angles of any plane triangle, is equal to the continued product of those tangents.... (XXXI.)

37. Having thus given the chief properties of the sines, tangents, &c. of arcs, their sines, products, and powers, we shall merely subjoin investigations of theorems for the 2d and 3d cases in the solutions of plane triangles. Thus, with respect to the second case, where two sides and their included angle are given:

By equa. IV, $a:b::\sin.\,A:\sin.\,B$.

By compos. and division $\Big\}$ $a+b:a-b::\sin.\,A+\sin.\,B:\sin.\,A-\sin.\,B$.

But, equa. XXII, $\tan.\,\frac{1}{2}(A+B):\tan.\,\frac{1}{2}(A-B)::\sin.\,A+\sin.\,B:\sin.\,A-\sin.\,B$; whence, ex equal. $a+b:a-b::\tan.\,\frac{1}{2}(A+B):\tan.\,\frac{1}{2}(A-B)$.. (XXXII.)

Agreeing with the result of the usual geometrical investigation.

38. If, instead of having the two sides a, b, given, we know their logarithms, as frequently happens in geodesic operations, $\tan.\,\frac{1}{2}(A-B)$ may be readily determined without first finding the number corresponding to the logs. of a and b. For if a and b were considered as the sides of a right-angled triangle, in which φ denotes the angle opposite the side a, then would $\tan.\,\varphi=\dfrac{a}{b}$. Now, since a is supposed greater than b, this angle will be greater than half a right angle, or it will be measured by an arc greater than $\frac{1}{8}$ of the circumference, or than $\frac{1}{8}O$. Then, because $\tan.\,(\varphi-\frac{1}{8}O)=\dfrac{\tan.\,\varphi-\tan.\,\frac{1}{8}O}{1+\tan.\,\varphi\,\tan.\frac{1}{8}O}$, and because $\tan.\,\frac{1}{8}O=R=1$, we have

$$\tan.\,(\varphi-\tfrac{1}{8}O)=\left(\frac{a}{b}-1\right)\div\left(1+\frac{a}{b}\right)=\frac{a-b}{a+b}.$$

And, from the preceding article,

$$\frac{a-b}{a+b}=\frac{\tan.\,\frac{1}{2}(A-B)}{\tan.\,\frac{1}{2}(A+B)}=\frac{\tan.\,\frac{1}{2}(A-B)}{\cot.\,\frac{1}{2}C}:$$

consequently, $\tan.\,\frac{1}{2}(A-B)=\cot.\,\frac{1}{2}C\,.\,\tan.\,(\varphi-\frac{1}{8}O)$.... (XXXIII.)

From this equation we have the following practical rule: substract the less from the greater of the given logs. the remainder will be the log. tan. of an angle: from this angle take 45 degrees, and to the log. tan. of the remainder add the log. cotan. of half the given angle; the sum will be the log. tan. of half the difference of the other two angles of the plane triangle.

39. The remaining case is that in which the three sides of the triangle are known, and for which indeed we have already obtained expressions for the angles in arts. 6 and 8. But, as neither of these is best suited for logarithmic computation, (however well fitted they are for instruments of investigation), another may be deduced thus: in the equation for cos. A, (given equation II), viz. $\cos.\,A=\dfrac{b^2+c^2-a^2}{2bc}$, if we substitute, instead of cos. A, its value $1-2\sin^2.\,\frac{1}{2}A$, change the signs of all the terms, transpose the 1, and divide by 2, we shall have $\sin^2.\,\frac{1}{2}A=\dfrac{a^2-b^2-c^2+2bc}{4bc}=\dfrac{a^2-(b-c)^2}{4bc}$.

Here, the numerator of the second member being the product of the two factors $(a+b-c)$ and $(a-b+c)$, the equation will become $\sin^2.\,\frac{1}{2}A=\dfrac{\frac{1}{2}(a+b-c)\,.\,\frac{1}{2}(a-b+c)}{4bc}$. But, since $\frac{1}{2}(a+b-c)=\frac{1}{2}(a+b+c)-c$, and $\frac{1}{2}(a-b+c)=\frac{1}{2}(a+b+c)-b$; if we put $s=a+b+c$, and extract the square root, there will result,

$$\left.\begin{array}{rl} & \sin.\,\frac{1}{2}A=\sqrt{\dfrac{(\frac{1}{2}s-b)\,.\,(\frac{1}{2}s-c)}{bc}}. \\ \text{In like manner}\Big\{ & \sin.\,\frac{1}{2}B=\sqrt{\dfrac{(\frac{1}{2}s-a)\,.\,(\frac{1}{2}s-c)}{ac}}. \\ & \sin.\,\frac{1}{2}C=\sqrt{\dfrac{(\frac{1}{2}s-a)\,.\,(\frac{1}{2}s-b)}{ab}}. \end{array}\right\}\text{(XXXIV.)}$$

These expressions, besides their convenience for logarithmic computation, have the further advantage of being perfectly free from ambiguity, because the half of any angle of a plane triangle will always be less than a right angle.

40. The student will find it advantageous to collect into one place all those formulæ which relate to the computation of sines, tangents, &c.; and, in another place, those which are of use in the solutions of plane triangles: the former of these are equations, V, VIII, IX, X, XI, *x*, *xi*, XII, XIII, XIV, XV, XVI, XVII, XVIII, XIX, XX, XXII, *xxii*, XXIII, XXIV, XXVII; the latter are equa. II, III, IV, VII, XXXII, XXXIII, XXXIV.

To exemplify the use of some of these formulæ, the following exercises are subjoined.

EXERCISES.

Ex. 1. Find the sines and tangents of 15°, 30°, 45°, 60°, and 75°; and show how from thence to find the sines and tangents of several of their submultiples.

First, with regard to the arc of 45°, the sine and cosine are manifestly equal; or they form the perpendicular and base of a right-angled triangle whose hypothenuse is equal to the assumed radius. Thus, if radius be R, the sine and cosine of 45°, will each be $=\sqrt{\tfrac{1}{2}R^2}=R\sqrt{\tfrac{1}{2}}=\tfrac{1}{2}R\sqrt{2}$. If R be equal to 1, as is the case with the tables in use, then

$$\text{sin. } 45^\circ=\text{cos. } 45^\circ=\tfrac{1}{2}\sqrt{2}={\cdot}7071068.$$

$$\text{tan. } 45^\circ=\frac{\text{sin.}}{\text{cos.}}=1=\frac{\text{cos.}}{\text{sin.}}=\text{cotangent } 45^\circ.$$

Secondly, for the sines of 60° and of 30°: since each angle in an equilateral triangle contains 60°, if a perpendicular be demitted from any one angle of such a triangle on the opposite side, considered as a base, that perpendicular will be the sine of 60°, and the half base the sine of 30°, the side of the triangle being the assumed radius. Thus, if it be R, we shall have $\tfrac{1}{2}R$ for the sine of 30°, and $\sqrt{R^2-\tfrac{1}{4}R^2}=\tfrac{1}{2}R\sqrt{3}$, for the sine of 60°. When $R=1$, these become

$$\text{sin. } 30^\circ={\cdot}5 \ldots\ldots \text{sin. } 60^\circ=\text{cos. } 30^\circ={\cdot}8660254.$$

$$\text{Hence, tan. } 30^\circ=\frac{{\cdot}5}{\tfrac{1}{2}\sqrt{3}}=\frac{1}{\sqrt{3}}=\tfrac{1}{3}\sqrt{3}={\cdot}5773503,$$

$$\text{tan. } 60^\circ=\frac{\tfrac{1}{2}\sqrt{3}}{\tfrac{1}{2}}=\sqrt{3}=\ldots\ldots 1{\cdot}7320508.$$

Consequently, tan. 60° = 3 tan. 30°.

Thirdly, for the sines of 15° and 75°, the former arc is the half of 30°, and the latter is the compliment of that half arc. Hence, substituting 1 for R and $\tfrac{1}{2}\sqrt{3}$, for cos. A, in the expression $\text{sin. } \tfrac{1}{2}A=\pm\tfrac{1}{2}\sqrt{2R^2\pm 2R \text{ cos. } A}$ ..... (equa. XII), it becomes $\text{sin. } 15^\circ=\tfrac{1}{2}\sqrt{2-\sqrt{3}}={\cdot}2588190$.

Hence, $\text{sin. } 75^\circ=\text{cos. } 15^\circ=\sqrt{1-\tfrac{1}{4}(2-\sqrt{3})}=\tfrac{1}{2}\sqrt{2+\sqrt{3}}=\dfrac{\sqrt{6}+\sqrt{2}}{4}={\cdot}9659258$.

$$\text{Consequently, tan. } 15^\circ=\frac{\text{sin.}}{\text{cos.}}=\frac{{\cdot}2588190}{{\cdot}9659258}={\cdot}2679492.$$

$$\text{And, tan. } 75^\circ=\frac{{\cdot}9659258}{{\cdot}2588190}=3{\cdot}7320508.$$

Now, from the sine of 30°, those of 6°, 2°, and 1°, may easily be found. For, if $5A=30^\circ$, we shall have, from equation X, $\text{sin. } 5A=5 \text{ sin. } A-20 \text{ sin}^3. A+16 \text{ sin}^5. A$: or, if $\text{sin. } A=x$, this will become $16x^5-20x^3+5x={\cdot}5$. This equation solved by any of the approximating rules for such equations, will give $x={\cdot}1045285$, which is the sine of 6°.

Next, to find the sine of 2°, we have again, from equation X, $\text{sin. } 3A=3 \text{ sin. } A-4 \text{ sin}^3. A$: that is, if x be put for sin. 2°, $3x-4x^3={\cdot}1045285$. This cubic solved, gives $x={\cdot}0348995=\text{sin. } 2^\circ$.

Then, if $s=\text{sin. } 1^\circ$, we shall, from the second of the equations marked X, have $2s\sqrt{1-s^2}={\cdot}0348995$; whence s is found $={\cdot}0174524=\text{sin. } 1^\circ$.

Had the expression for the sines of bisected arcs been applied successively from sin. 15°, to sin. 7°30°, sin. 3°45′, sin. 1°52½′, sin. 56¼′, &c. a different series of values might have been obtained: or, if we had proceeded from the quinquisection of 45°, to the trisection of 9°, the bisection of 3°, and so on, a different series still would have been found. But what has been done above is sufficient to illustrate this method. The next example will exhibit a very simple and compendious way of ascending from the sines of smaller to those of larger arcs.

Ex. 2. Given the sine of 1°, to find the sine of 2°, and then the sines of 3°, 4°, 5°, 6°, 7°, 8°, 9°, and 10°, each by a single proportion.

Here, taking first the expression for the sine of a double arc, equa. X, we have $\text{sin. } 2^\circ=2 \text{ sin. } 1^\circ \sqrt{1-\text{sin}^2. 1^\circ}={\cdot}0348995$.

Then it follows from the rule in equa. XX, that

$$\begin{aligned}
&\text{sin. } 1^\circ : \text{sin. } 2^\circ-\text{sin. } 1^\circ :: \text{sin. } 2^\circ+\text{sin. } 1^\circ : \text{sin. } 3^\circ={\cdot}0523360\\
&\text{sin. } 2^\circ : \text{sin. } 3^\circ-\text{sin. } 1^\circ :: \text{sin. } 3^\circ+\text{sin. } 1^\circ : \text{sin. } 4^\circ={\cdot}0697565\\
&\text{sin. } 3^\circ : \text{sin. } 4^\circ-\text{sin. } 1^\circ :: \text{sin. } 4^\circ+\text{sin. } 1^\circ : \text{sin. } 5^\circ={\cdot}0871557\\
&\text{sin. } 4^\circ : \text{sin. } 5^\circ-\text{sin. } 1^\circ :: \text{sin. } 5^\circ+\text{sin. } 1^\circ : \text{sin. } 6^\circ={\cdot}1045285\\
&\text{sin. } 5^\circ : \text{sin. } 6^\circ-\text{sin. } 1^\circ :: \text{sin. } 6^\circ+\text{sin. } 1^\circ : \text{sin. } 7^\circ={\cdot}1218693\\
&\text{sin. } 6^\circ : \text{sin. } 7^\circ-\text{sin. } 1^\circ :: \text{sin. } 7^\circ+\text{sin. } 1^\circ : \text{sin. } 8^\circ={\cdot}1391731\\
&\text{sin. } 7^\circ : \text{sin. } 8^\circ-\text{sin. } 1^\circ :: \text{sin. } 8^\circ+\text{sin. } 1^\circ : \text{sin. } 9^\circ={\cdot}1564375\\
&\text{sin. } 8^\circ : \text{sin. } 9^\circ-\text{sin. } 1^\circ :: \text{sin. } 9^\circ+\text{sin. } 1^\circ : \text{sin. } 10^\circ={\cdot}1736482
\end{aligned}$$

To check and verify operations like these, the proportions should be changed at certain stages. Thus,

$$\begin{aligned}
&\text{sin. } 1^\circ : \text{sin. } 3^\circ-\text{sin. } 2^\circ :: \text{sin. } 3^\circ+\text{sin. } 2^\circ : \text{sin. } 5^\circ,\\
&\text{sin. } 1^\circ : \text{sin. } 4^\circ-\text{sin. } 3^\circ :: \text{sin. } 4^\circ+\text{sin. } 3^\circ : \text{sin. } 7^\circ,\\
&\text{sin. } 4^\circ : \text{sin. } 7^\circ-\text{sin. } 3^\circ :: \text{sin. } 7^\circ+\text{sin. } 3^\circ : \text{sin. } 10^\circ.
\end{aligned}$$

The coincidence of the results of these operations with the analogous results in the preceding, will manifestly establish the correctness of both.

Cor. By the same method, knowing the sines of 5°, 10°, and 15°, the sines of 20°, 25°, 35°, 55°, 65°, &c. may be found, each by a single proportion. And the sines of 1°, 9°, and 10°, will lead to those of 19°, 29°, 39°, &c. So that the sines may be computed to any arc: and the tangents and other trigonometrical lines, by means of the expressions in art. 4, &c.

Ex. 3. Find the sum of all the natural sines to every minute in the quadrant, radius = 1.

In this problem the actual addition of all the terms would be a most tiresome labour: but the solution by means of equation XXVII, is rendered very easy. Applying that theorem to the present case, we have $\text{sin. }(A+\tfrac{1}{2}nB)=\text{sin. } 45^\circ$, $\text{sin. } \tfrac{1}{2}(n+1)B=\text{sin. } 45^\circ\, 0'\, 30''$, and $\text{sin. } \tfrac{1}{2}B=\text{sin. } 30''$. Therefore

$$\frac{\text{sin. } 45^\circ \times \text{sin. } 45^\circ\, 6'\, 30''}{\text{sin. } 30''}=3438{\cdot}2467465 \text{ the sum}$$

required.

From another method, the investigation of which is omitted here, it appears that the same sum is equal to $\tfrac{1}{2}(\text{cot. } 30''+1)$.

Ex. 4. Explain the method of finding the logarithmic sines, cosines, tangents, secants, &c. the natural sines, cosines, &c. being known.

The natural sines and cosines being computed to the radius unity, are all proper fractions, or quantities less than unity, so that their logarithms would be negative. To avoid this, the tables of logarithmic sines, cosines, &c. are computed to a radius of 10000000000, or 10^{10}; in which case the logarithm of the radius is 10 times the log. of 10, that is, it is 10.

Hence, if s represent any sine to radius 1, then $10^{10}\times s=$ sine of the same arc or angle to rad.

10^{10}. And this, in logs. is, log. $10^{10}\, s = 10$ log. $10 +$ log. $s = 10 +$ log. s.

The log. cosines are found by the same process, since the cosines are the sines of the complements.

The logarithmic expressions for the tangents, &c. are deduced thus:

Tan. $=$ rad. $\dfrac{\text{sin.}}{\text{cos.}}$. Therefore, log. tan. $=$ log. rad. $+$ log. sin. $-$ log. cos. $= 10 +$ log. sin. $-$ log. cos.

Cot. $= \dfrac{\text{rad}^2.}{\text{tan.}}$. Therefore, log. cot. $= 2$ log. rad. $-$ log. tan. $= 20 -$ log. tan.

Sec. $= \dfrac{\text{rad}^2.}{\text{cos.}}$. Therefore, log. sec. $= 2$ log. rad. $-$ log. cos. $= 20 -$ log. cos.

Cosec. $= \dfrac{\text{rad}^2.}{\text{sin.}}$. Therefore, log. cosec. $= 2$ log. rad. $-$ log. sin. $= 20 -$ log. sin.

$$\text{Versed sine} = \frac{\text{chord}^2}{\text{diam.}} = \frac{(2\ \text{sin.}\ \frac{1}{2}\ \text{arc})^2}{2\ \text{rad.}} = \frac{2 \times \text{sin}^2.\ \frac{1}{2}\ \text{arc}}{\text{rad.}}.$$

Therefore, log. vers. sin. $=$ log. $2 + 2$ log. sin. $\frac{1}{2}$ arc $- 10$.

Ex. 5. Given the sum of the natural tangents of the angles A and B of a plane triangle $= 3{\cdot}1601988$, the sum of the tangents of the angles B and C $= 3{\cdot}8765577$, and the continued product, tan. A . tan. B . tan. C $= 5{\cdot}3047057$: to find the angles A, B, and C.

It has been demonstrated in art. 36, that when radius is unity, the product of the natural tangents of the three angles of a plane triangle is equal to their continued product. Hence the process is this:

From tan. A + tan. B + tan. C $= 5{\cdot}3047057$
Take tan. A + tan. B …… $= 3{\cdot}1601988$
Remains tan. C ………… $= 2{\cdot}1445069 =$ tan. 65°.
From tan. A + tan. B + tan. C $= 5{\cdot}3047057$
Take tan. B + tan. C …… $= 3{\cdot}8765577$
Remains tan. A ………… $= 1{\cdot}4281480 =$ tan. 55°.

Consequently, the three angles are 55°, 60°, and 65°.

Ex. 6. There is a plane triangle, whose sides are three consecutive terms in the natural series of integer numbers, and whose largest angle is just double the smallest. Required the sides and angles of that triangle?

If A, B, C, be three angles of a plane triangle, a, b, c, the sides respectively opposite to A, B, C; and $s = a + b + c$. Then from equa. III and XXXIV, we have

$$\text{sin. A} = \frac{2}{bc}\sqrt{\tfrac{1}{2}s\,(\tfrac{1}{2}s - a)\cdot(\tfrac{1}{2}s - b)\cdot(\tfrac{1}{2}s - c)},$$

$$\text{and sin. } \tfrac{1}{2}\,\text{C} = \sqrt{\frac{(\frac{1}{2}s - a)\cdot(\frac{1}{2}s - b)}{ab}}.$$

Let the three sides of the required triangle be represented by x, $x+1$, and $x+2$; the angle A being supposed opposite to the side x, and C opposite to the side $x+2$: then the preceding expressions will become

$$\text{sin. A} = \frac{2}{(x+1)\cdot(x+2)}\sqrt{\frac{3x+3}{2}\cdot\frac{x+3}{2}\cdot\frac{x+1}{2}\cdot\frac{x-1}{2}}.$$

$$\text{sin. } \tfrac{1}{2}\text{C} = \sqrt{\frac{(x+1)\cdot(x+3)}{4x\,(x+1)}}.$$

Assuming these two expressions equal to each other, as they ought to be, by the question; there results, after a little reduction, $x^3 - \frac{5}{2}x^2 - \frac{11}{2}x - 2 = 0$, a cubic equation, with one positive integer root $x = 4$. Hence 4, 5, and 6, are the sides of the triangle.

$$\text{sin. A} = \tfrac{2}{5\cdot6}\sqrt{\tfrac{15}{2}\cdot\tfrac{7}{2}\cdot\tfrac{5}{2}\cdot\tfrac{3}{2}} = \tfrac{2}{5\cdot6}\sqrt{\tfrac{15}{4}\cdot\tfrac{15}{4}\cdot7} = \tfrac{2\cdot15}{4\cdot5\cdot6}\sqrt{7} = \tfrac{1}{4}\sqrt{7}.$$

$$\text{sin. B} = \tfrac{5}{16}\sqrt{7};\ \text{sin. C} = \tfrac{6}{16}\sqrt{7};\ \text{sin. } \tfrac{1}{2}\text{C} = \sqrt{\tfrac{7\cdot5}{2\cdot2\cdot4\cdot5}} = \tfrac{1}{4}\sqrt{7}.$$

The angles are, A $= 41^\circ{\cdot}409603 = 41^\circ\ 24'\ 34''\ 34'''$,
B $= 55^\circ{\cdot}771191 = 55\ \ 46\ \ 16\ \ 18$,
C $= 82^\circ{\cdot}819206 = 82\ \ 49\ \ \ 9\ \ \ 8$.

General Properties of Spherical Triangles.

Art. 1. *Def.* 1. Any portion of a spherical surface bounded by three arcs of great circles is called a spherical triangle.

Def. 2. Spherical trigonometry is the art of computing the measures of the sides and angles of spherical triangles.

Def. 3. A right-angled spherical triangle has one right angle: the sides about the right angle are called legs; the side opposite to the right angle is called the hypothenuse.

Def. 4. A quadrantal spherical triangle has one side equal to 90° or a quarter of a great circle.

Def. 5. Two arcs or angles, when compared together, are said to be alike, or of the same affection, when both are less than 90°, or both are greater than 90°. But when one is greater and the other less than 90°, they are said to be unlike, or of different affections.

Art. 2. The small circles of the sphere do not fall under consideration in spherical trigonometry; but such only as have the same centre with the sphere itself. And hence it is that spherical trigonometry is of so much use in practical astronomy, the apparent heavens assuming the shape of a concave sphere, whose centre is the same as the centre of the earth.

3. Every spherical triangle has three sides and three angles: and if any three of these six parts be given, the remaining three may be found, by some of the rules which will be investigated in this chapter.

4. In plane trigonometry, the knowledge of the three angles is not sufficient for ascertaining the sides: for in that case the relations only of the three sides can be obtained, and not their absolute values: whereas, in spherical trigonometry, where the sides are circular arcs, whose values depend on their proportion to the whole circle, that is, on the number of degrees they contain, the sides may always be determined when the three angles are known. Other remarkable differences between plane and spherical triangles are, 1st. That in the former, two angles always determine the third; while in the latter they never do. 2dly. The surface of a plane triangle cannot be determined from a knowledge of the angles alone; while that of a spherical triangle always can.

5. The sides of a spherical triangle are all arcs

of great circles, which, by their intersection on the surface of the sphere, constitute that triangle.

6. The angle which is contained between the arcs of two great circles, intersecting each other on the surface of the sphere, is called a spherical angle; and its measure is the same as the measure of the plane angle which is formed by two lines issuing from the same point of, and perpendicular to, the common section of the planes which determine the containing sides: that is to say, it is the same as the angle made by those planes. Or, it is equal to the plane angle formed by the tangents to those arcs at their point of intersection.

7. Hence it follows, that the surface of a spherical triangle BAC, fig. 10, and the three planes which determine it, form a kind of triangular pyramid, BCGA, of which the vertex G is at the centre of the sphere, the base ABC a portion of the spherical surface, and the faces AGC, AGB, BGC, sectors of the great circles whose intersections determine the sides of the triangle.

Def. 6. A line perpendicular to the plane of a great circle, passing through the centre of the sphere, and terminated by two points, diametrically opposite, at its surface, is called the axis of such circle; and the extremities of the axis, or the points where it meets the surface, are called the poles of that circle. Thus, PGP′ is the axis, and P, P′, are the poles, of the great circle CND.

If we conceive any number of less circles, each parallel to the said great circle, this axis will be perpendicular to them likewise: and the points P, P′, will be their poles also.

8. Hence, each pole of a great circle is 90° distant from every point in its circumference; and all the arcs drawn from either pole of a little circle to its circumference, are equal to each other.

9. It likewise follows, that all the arcs of great circles drawn through the poles of another great circle, are perpendicular to it: for, since they are great circles by the supposition, they all pass through the centre of the sphere, and consequently through the axis of the said circle. The same thing may be affirmed with regard to small circles.

10. Hence, in order to find the poles of any circle, it is merely necessary to describe, upon the surface of the sphere, two great circles perpendicular to the plane of the former; the points where these circles intersect each other will be the poles required.

11. It may be inferred also, from the preceding, that if it were proposed to draw, from any point assumed on the surface of the sphere, an arc of a circle which may measure the shortest distance from that point, to the circumference of any given circle; this arc must be so described, that its prolongation may pass through the poles of the given circle. And conversely, if an arc pass through the poles of a given circle, it will measure the shortest distance from any assumed point to the circumference of that circle.

12. Hence again, if upon the sides, AC and BC, (produced if necessary) of a spherical triangle BCA, we take the arcs CN, CM, each equal 90°, and through the radii GN, GM, fig. 10, draw the plane NGM, it is manifest that the point C will be the pole of the circle coinciding with the plane NGM: so that, as the lines GM, GN, are both perpendicular to the common section GC, of the planes AGC, BGC, they measure, by their inclination, the angle of these planes; or the arc NM measures that angle, and consequently the spherical angle BCA.

13. It is also evident that every arc of a little circle, described from the pole C as centre, and containing the same number of degrees as the arc MN, is equally proper for measuring the angle BCA; though it is customary to use only arcs of great circles for this purpose.

14. Lastly, we infer, that if a spherical angle be a right angle, the arcs of the great circles which form it, will pass mutually through the poles of each other: and that, if the planes of two great circles contain each the axis of the other, or pass through the poles of each other, the angle which they include is a right angle.

These obvious truths being premised, we shall here add three tables for the solution of all the cases of trigonometry.

TABLE I.

For the Solution of all the Cases of Right-Angled Spherical Triangles.

Given.	Required.	Values of the Terms required.	Cases in which the terms required are less than 90°.
I. Hypothenuse, and one leg.	Angle opposite to the given leg.	Its sin. $=\frac{\text{sin. given leg.}}{\text{sin. hypoth.}}$.	If the given leg be less than 90°.
	Angle adjacent to the given leg.	Its cos. $=\frac{\text{tan. given leg.}}{\text{tan. hypoth.}}$.	If the things given be of the same affection.
	Other leg.	Its cos. $=\frac{\text{cos. hypoth.}}{\text{cos. given leg.}}$.	Idem.
II. One leg, and its opposite angle.	Hypothenuse.	Its sin. $=\frac{\text{sin. given leg.}}{\text{sin. given ang.}}$.	Ambiguous.
	Other leg.	Its sin. $=\frac{\text{tan. given leg.}}{\text{tan. given ang.}}$.	Idem.
	Other angle.	Its sin. $=\frac{\text{cos. given ang.}}{\text{cos. given leg.}}$.	Idem.
III. One leg, and the adjacent angle.	Hypothenuse.	Its tan. $=\frac{\text{tan. given leg.}}{\text{cos. given ang.}}$.	If the things given be of like affection.
	Other angle.	Its cos. = cos. giv. leg. × sin. giv. ang.	If the given leg. be less than 90°.
	Other leg.	Its tan. = sin. giv. leg. tan. giv. ang.	If the given angle be less than 90°.
IV. Hypothenuse, and one angle.	Adjacent leg.	Its tan. = tan. hyp. × cos. giv. ang.	If the things given be of like affection.
	Leg opp. to the given angle.	Its sin. = sin. hyp. × sin. giv. ang.	If the given angle be acute.
	Other angle.	Its tan. $=\frac{\text{cot. giv. angle}}{\text{cos. hypothen.}}$.	If the things given be of like affection.
V. The two legs.	Hypothenuse.	Its cos. = rectan. cos. giv. legs.	If the given legs be of like affection.
	Either of the angles.	Its tan. $=\frac{\text{tan. oppos. leg.}}{\text{sin. adjac. leg.}}$.	If the opposite leg be less than 90°.
VI. The two angles.	Hypothenuse.	Its cos. = rect. cot. giv. angles.	If the angles be of like affection.
	Either of the legs.	Its cos. $=\frac{\text{cos. opposite angle}}{\text{sin. adjacent angle}}$.	If the opposite angle be acute.

In working by the logarithms, the student must observe that when the resulting logarithm is the log. of a quotient, 10 must be added to the index; when it is the log. of a product, 10 must be subtracted from the index. Thus when the two angles are given,

Log. cos. hypothen. = log. cos. one angle + log. cos. other angle − 10;
Log. cos. either leg = log. cos. opp. angle − log. sin. adjac. angle + 10.

In a quadrantal triangle, if the quadrantal side be called radius, the supplement of the angle opposite to that side be called hypothenuse, the other sides be called angles, and their opposite angles be called legs: then the solutions of all the cases will be as in this table; merely changing *like* for *unlike* in the determinations.

TABLE II.

For the Solution of Oblique-Angled Spherical Triangles.

An angle or a side being divided by a perpendicular, the first and second segments are denoted by 1 seg. and 2 seg.

Given.	Required.	Values of the Quantities required.	
I. Two angles and a side opposite to one of them.	The side opp. to other angle.	By the common analogy.	Sines of angles are as sines of opp. sides.
	Third side.	Let fall a per. on the side contained between the given angles.	Tan. 1 seg. of this side = cos. adj. angle × tan. given side. $\text{Sin. 2 seg.}=\frac{\text{sin. 1 seg.}\times\text{tan. ang. adj. given side}}{\text{tan. ang. opp. given side}}.$
	Third angle.	Let fall a per. as before.	Cot. 1 seg. of this ang. = cos. giv. side × tan. adj. angle. $\text{Sin. 2 seg.}=\frac{\text{sin. 1 seg.}\times\text{cos. ang. opp. given side}}{\text{cos. ang. adj. given side}}.$
II. Two sides and an angle opposite to one of them.	The angle opposite to the other side.	By the common analogy.	Sines of sides are as sines of their opposite angles.
	Angle included between the given sides.	Let fall a perpendicular from the included angle.	Cot. 1 seg. ang. req. = tan. giv. ang. × cos. adj. side. $\text{Cos. 2 seg.}=\frac{\text{cos. 1 seg.}\times\text{tan. giv. side adj. giv. angle}}{\text{tan. side opp. given angle.}}.$
	Third side.	Let fall a perpendicular as before.	Tan. 1 seg. side req. = cos. giv. ang. × tan. adj. side. $\text{Cos. 2 seg.}=\frac{\text{cos. 1 seg.}\times\text{cos. side opp. giv. angle}}{\text{cos. side adj. given angle.}}.$
III. Two sides and the included angle.	An angle opposite to one of the given sides.	Let fall a perpendicular from the third angle.	Tan. 1 seg. of div. side = cos. giv. ang. × tan. side opp. ang. sought. $\text{Tan. ang. sought}=\frac{\text{tan. giv. ang.}\times\text{sin. 1 seg.}}{\text{sin. 2 seg. of }\cancel{\text{div}}\text{. side}}.$
	Third side.	Let fall a perpendicular on one of the giv. sides.	Tan. 1 seg. of div. side = cos. giv. ang. × tan. other given side. $\text{Cos. side sought}=\frac{\text{cos. side not div.}\times\text{cos. 2 seg.}}{\text{cos. 1 seg. of side divided.}}.$
IV. A side and the two adjacent angles.	A side opposite to one of the given angles.	Let fall a perpendicular on the third side.	Cot. 1 seg. of div. ang. = cos. giv. side × tan. ang. opp. side sought. $\text{Tan. side sought}=\frac{\text{tan. giv. side}\times\text{cos. 1 seg. div. ang.}}{\text{cos. 2 seg. of divided angle.}}.$
	Third angle.	Let fall a perpendicular from one of the given angles.	Cot. 1 seg. div. ang. = cos. giv. side × tan. other giv. angle. $\text{Cos. angle sought}=\frac{\text{cos. ang. not div.}\times\text{sin. 2 seg.}}{\text{sin. 1 seg. div. angle.}}.$
V. The three sides.	An angle by the sine or cosine of its half.	Let *a*, *b*, *c*, be the sides; A, B, C, the angles, *b* and *c* including the angle sought, and $s=a+b+c$. Then, $\sin.\tfrac{1}{2}A=\sqrt{\frac{\sin.(\frac{1}{2}s-b).\sin.(\frac{1}{2}s-c)}{\sin.b.\sin.c}}..\cos.\tfrac{1}{2}A=\sqrt{\frac{\sin.\frac{1}{2}s.\sin.(\frac{1}{2}s-a)}{\sin.b.\sin.c}}.$	
VI. The three angles.	A side by the sine or cosine of its half.	Let s be the sum of the angles A, B, and C: and let B and C be adjacent to *a* the side required. Then, $\sin.\tfrac{1}{2}a=\sqrt{-\frac{\cos.\frac{1}{2}s.\cos.(\frac{1}{2}s-A)}{\sin.B.\sin.C}}\cos.\tfrac{1}{2}a=\sqrt{-\frac{\sin.(\frac{1}{2}s-B).\sin.(\frac{1}{2}s-C)}{\sin.B.\sin.C}}.$	

TABLE III.

For the Solution of all the Cases of Oblique-Angled Spherical Triangles, by the Analogies of Napier.

Given.	Required.	Values of the Terms required.
I. Two angles and one of their opposite sides.	Side opposite to the other given angle.	By the common analogy, sines of angles as sines of opposite sides.
	Third side.	Tan. of its half $=\frac{\text{tan. }\frac{1}{2}\text{ diff. giv. sides}\times\text{sin. }\frac{1}{2}\text{ sum opp. angles}}{\text{sin. }\frac{1}{2}\text{ diff. of those angles}}$ $=\frac{\text{tan. }\frac{1}{2}\text{ sum giv. sides}\times\text{cos. }\frac{1}{2}\text{ sum opp. angles}}{\text{cos. }\frac{1}{2}\text{ diff. of those angles}}$
	Third angle.	By the common analogy.
II. Two sides, and an opposite angle.	Angle opposite to the other known side.	By the common analogy.
	Third angle.	Cot. of its half $=\frac{\text{tan. }\frac{1}{2}\text{ diff. other two ang.}\times\text{sin. }\frac{1}{2}\text{ sum giv. sides}}{\text{sin. }\frac{1}{2}\text{ diff. those sides.}}$ $=\frac{\text{tan. }\frac{1}{2}\text{ sum of other two ang.}\times\text{cos. }\frac{1}{2}\text{ sum giv. sides}}{\text{cos. }\frac{1}{2}\text{ diff. of those sides.}}$
	Third side.	By the common analogy.
III. Two sides, and the included angle.	The other two angles.	Tan. $\frac{1}{2}$ their diff. $=\frac{\text{cot. }\frac{1}{2}\text{ giv. ang.}\times\text{sin. }\frac{1}{2}\text{ diff. giv. sides}}{\text{sin. }\frac{1}{2}\text{ sum of those sides}}$. Tan. $\frac{1}{2}$ their sum $=\frac{\text{cot. }\frac{1}{2}\text{ giv. ang.}\times\text{cos. }\frac{1}{2}\text{ diff. giv. sides}}{\text{cos. }\frac{1}{2}\text{ sum of those sides}}$.
	Third side.	By the common analogy.
IV. Two angles, and the side between them.	The other two sides.	Tan. $\frac{1}{2}$ their diff. $=\frac{\text{tan. }\frac{1}{2}\text{ giv. side}\times\text{sin. }\frac{1}{2}\text{ diff. giv. angles}}{\text{sin. }\frac{1}{2}\text{ sum of those angles}}$. Tan. $\frac{1}{2}$ their sum $=\frac{\text{tan. }\frac{1}{2}\text{ giv. side}\times\text{cos. }\frac{1}{2}\text{ diff. giv. angles}}{\text{cos. }\frac{1}{2}\text{ sum of those angles}}$.
	Third angle.	By the common analogy.
V. The three sides.	Either of the angles.	Let fall a perpen. on the side adjacent to the angle sought. Tan. $\frac{1}{2}$ sum or $\frac{1}{2}$ diff. of the seg. of the base $=\frac{\text{tan. }\frac{1}{2}\text{ sum}\times\text{tan. }\frac{1}{2}\text{ diff. of the sides}}{\text{tan. }\frac{1}{2}\text{ base}}$. Cos. angle sought = tan. adj. seg. × cot. adj. side.
VI. The three angles.	Either of the sides.	Will be obtained by finding its correspondent angle in a triangle which has all its parts supplemental to those of the triangle whose three angles are given.

For more on the subject of trigonometry, the reader may consult the treatises by Simpson, Emerson, Mauduitt, Cagnoli, Keith, Bonnycastle, and Woodhouse.

TRIGONOME'TRICAL. *a.* (from *trigonometry.*) Pertaining to trigonometry.

TRIGONOUS. Triangular.

TRIGUERA, in botany, a genus of the class pentandria, order monogynia. Corol campanulate, with an unequal border; nectary short, surrounding the germ, five-toothed; filaments inserted into the nectary; berry four-celled, the cells two-seeded. Two species; natives of Boetia.

TRIGYNIA. (τρεις, and γυνη, a wife.) The name of the third order in the first thirteen classes of the Linnéan system, except the first, fourth, and seventh; including those plants which have three pistils to each flower. See Botany.

TRIHILATÆ (Three-scarred, see Hilum.) The name of the fiftieth order in Linnéus's Fragments; and of the twenty-third in his Natural Orders.

TRIJUGOUS LEAF. Trijugum folium. In botany, a pinnate leaf with three pairs of leaflets.

TRILA'TERAL. *a.* (*trilateral*, French; *tres* and *latus*, Latin.) Having three sides.

TRILIX, in botany, a genus of the class polyandria, order monogynia. Calyx three-leaved; corol three-petalled; berry five-celled, many-seeded. One species only, a shrub of Carthagena, with roughish branches; leaves alternate, heart-ovate, serrate, pubescent; peduncles generally terminal; alternate, one-flowered, pubescent pedicles.

TRILL, or Trillo, in music. A shake.

To Trill. *v. a.* (from the noun.) To utter quavering (*Thomson*).

To Trill. *v. n.* 1. To trickle; to fall in drops or slender streams (*Shakspeare*). 2. To play in tremulous vibrations of sound (*Dryden*).

TRI'LLION. *s.* (a word invented by *Locke.*) A million of millions of millions.

TRILLIUM, in botany, a genus of the class hexandria, order trigynia. Calyx three-leaved; corol three-petalled; berry superior, three-celled. Three species; all of which are cultivated.

1. T. cernum. Drooping trillium.
2. T. erectum. Upright trillium.
3. T. sessile. Sessile flowered trillium.

They are all American plants, with dark red or purple flowers; and may be easily propagated by seeds, and exposed to the climate of our own country as being hardy perennials.

TRIBOLATE LEAF, in botany. See Three-lobed.

TRILOCULAR PERICARP, in botany. See Three-celled.

TRILU'MINAR. Trilu'minous. *a.* (*triluminaris*, Latin.) Having three lights.

TRIM. *a.* (ʒeꞇꞃẏmmeð, Saxon, *completed.*) Nice; smug; dressed up (*Dryden*).

To Trim. *v. n.* (ꞇꞃimman, Saxon, *to build.*) 1. To fit out (*Shakspeare*). 2. To dress; to decorate (*Dryden*). 3. To shave; to clip (*Howel*). 4. To make neat; to adjust (*Ben Jonson*). 5. To balance a vessel (*Spectator*). 6. It has often *up* emphatical (*Shakspeare*).

To Trim. *v. n.* To balance; to fluctuate between two parties (*South*).

Trim. *s.* Dress; geer; ornaments (*Shakspeare*).

Trim of a ship, her best posture, proportion of ballast, and hanging of her masts, &c. for sailing. To find the trim of a ship is to find the best way of making her sail swiftly, or how she will sail best. This is done by easing of her masts and shrouds; some ships sailing much better when they are slack, than when they are taught or fast; but this depends much upon experience and judgment, and the several trials and observations which the commander and other officers may make aboard.

TRIMERES, in music, a nome of the ancient Greeks, which was executed in three consecutive modes, viz. the Phrygian, the Doric, and the Lydian. The invention of this compound nome is attributed by some writers to Sacados of Argos; by others to Clonos Thegeates.

TRI'MLY. *ad.* (from *trim.*) Nicely; neatly (*Spenser*).

TRI'MMER. *s.* (from *trim.*) 1. One who changes sides to balance parties; a turncoat (*Swift*). 2. A piece of wood inserted (*Mox.*).

TRI'MMING. *s.* (from *trim.*) Ornamental appendages to a coat or gown (*Garth*).

TRI'MNESS. *s.* (from *trim.*) Neatness; petty elegance of dress.

TRI'NAL. *a.* (*trinus*, Latin.) Threefold (*Spenser*).

TRINCOMALE, a seaport on the E. coast of Ceylon, with a harbour reckoned the finest in the East Indies, but situate in the most barren part of the island. The nearest farm villages are upward of 12 miles, from which the inhabitants are supplied with provisions. The harbour is defended by two forts, Trincomale and Ostenburg, the last built upon a cliff, projecting 1500 spaces into the sea. The town occupies more ground than Columba, but contains a much smaller number of houses, and of an inferior appearance. Its circumference within the walls is about three miles, but in this space is included a rising point, immediately over the sea, covered with thick jungle. Trincomale was taken from the Dutch, by the English, in 1782; retaken by the French the same year; restored to the Dutch, by the peace of 1783; and again taken by the English in 1795. It stands on a spacious bay of the same name, 100 miles N.N.E. of Candy. Lon. 81. 25 E. Lat. 8. 32 N.

TRINE. *s.* (*trine*, French; *trinus*, Latin.) An aspect of planets placed in three angles of a trigon, in which they are supposed by astrologers to be eminently benign (*Creech*).

To Trine. *v. a.* (from the noun.) To put in a trine aspect (*Dryden*).

Trine peduncles. (*terni pedunculi.*) Peduncles in threes, or three together from the same axil: as in impatiens zeylanica.

Trine flowers. (*terni flores.*) Flowers growing three and three together: as in beta cicla.

TRINE LEAVES, in botany. (*terna folia.*) Three-fold leaves, in threes, or three and three; expressing the number of leaves in each whorl or set: as in statice sinuata. See STELLATE.

TRINERVE LEAF, in botany. A three-nerved leaf. Having three nerves or unbranched vessels meeting in the base of the leaf.

TRINERVATE. Having them meeting behind or beyond (ponè) the base.

TRING, a town in Hertfordshire, with a market on Friday; seated near the Grand Junction Canal, 22 miles W. of Hertford, and 31 W.N.W. of London.

TRINGA. Sand-piper. Pewit. Ruff and reeve. In zoology, a genus of the classs aves, order grallæ. Bill roundish, as long as the head; nostrils small, linear; tongue slender; feet four-toed; the hind toe of one joint, and raised from the ground. Forty-eight species; inhabitants of Europe and America; a few of Asia; seventeen common to our own country. The following are the principal species.

1. T. pugnax. Ruff and reeve. Bill and legs rufous; three lateral tail-feathers without spots; face with flesh-colour granulations. These inhabit Europe as high as Siberia, and are found freely in our own country: they are twelve inches long, appear in the fens early in the spring, and disappear about Michaelmas. The ruffs or males fight with great obstinacy for the females or reeves, who lay four white eggs with rusty spots in a tuft of grass. The ruffs are so variable in their colour, that two are seldom found alike: but the long feathers of the neck resembling a ruff, and from which the specific name is derived, sufficiently characterise the species. Besides this ruff, there is, on the back of the neck, a tuft of feathers which spread out on both sides, and are always different in colour from those of the ruff. The reeves are less variable in their plumage; they are smaller than the males, and are brown, spotted in some parts with a white, or ash-colour.

The ruffs are caught in the fens by means of nets. When fattened, they are dressed, like the woodcock, with the intestines, and their whole contents, which are considered by the connoisseurs as the most delicate kind of seasoning for these birds. As the ruffs are extremely pugnacious, they must be kept, during the whole progress of their fattening, in a dark apartment; for, the moment the light is admitted, they attack one another with such fury and inveteracy, that the combat does not end till the greater part are slain on the field of battle.

The nets with which fowlers take the ruffs are about forty yards long, and seven or eight feet high. They are supported at the side of the fens by sticks, placed at an angle of forty-five degrees; and when the birds are enticed under them by a stale, or stuffed bird of their own species, the fowler, who is concealed among the reeds, suddenly pulls a string, by which the nets are brought down, and the prisoners secured.

2. T. vanellus. Lapwing. Bastard-plover. Pewit. Legs red; crest pendent; breast black. Inhabits the marshes and moist heaths of Europe, Asia, and Africa. In our own country these make their appearance in the meadows and marshy grounds, in the month of March; and, in some parts, are so numerous, that the fields echo with the plaintive note, *peeweet*, which they continually utter, and which has given rise, in France, to their common name of dixhuits. The long crest, which rises from the hind part of the head, consists of a few narrow feathers of a black and purple hue, resembling, as is supposed, the wing of that insect that flutters on the surface of the water, and is devoured by the trout. Hence the top of the pewit is greatly prized by such as are fond of the amusement of fishing, for with it they dress the finest flies.

These birds have a singular mode of collecting their food, which consists of worms. They observe the small swell of the ground, which the worm, when it returns below ground in the morning, makes by emptying itself. This it gently opens, at the top, with its bill, and then beats upon the ground at the side of it. By this small motion the worm is discomposed, and brought to the surface, when it is devoured by the bird, which is all the while keeping a sharp and watchful look-out for its appearance.

On the approach of night, the pewit has still an easier method of procuring its food, for the worms then make their appearance above ground of their own accord: and nothing more is necessary for the bird than to travel attentively over the grass, and feel with its feet for the worms that are creeping at the root of it.

On their first arrival, these birds crowd together in large flocks; but as soon as the pairing season commences, their society is soon dissolved by the quarrels of the males. During these, the females withdraw from the flock, as if they felt no interest in their disputes: but, in fact, with a view to draw after them some of the combatants, and to form with them a society of a more tender and intimate nature. The males are also very solicitous for their young, and fight vigorously for them: they feed on slugs as well as worms. The female lays four dirty olive eggs, spotted with black. The flesh is very delicious.

3. T. gambetta. Gambet. Bill and legs red; body variegated with pale yellow and cinereous; beneath white. Inhabits Europe and America: twelve inches long.

4. T. interpres. Turnstone. Sea-dottrel. Legs red; body black, varied with white and ferruginous; breast and belly white. The bill of the male black; colour of the female more dusky. Inhabits the sea-coasts of Europe and America; nine inches long; feeds on worms, turning over stones to look for them; builds on the ground, and lays four olive eggs spotted with black.

There are three other varieties; one with body grey and breast black, inhabiting Scotland and North America: a second, varied brown and white; quill feathers and bill dusky: a third, varied brown and white; the breast with brown spots; wings and tail brown, the feathers of the latter tipt with white. Both inhabit Cayenne.

5. T. lobata. Grey phalarope. Bill subulate, bent in at the tip; feet pinnate; breast waved with white. Another variety, beneath white, above black, with longitudinal yellowish stripes; band on the wings white; feet lobate. These inhabit Europe, Asia and America; rarely England: size of the common purre: in stormy weather they swim in great numbers on lakes, but in fine weather are solitary among the fens.

6. T. ochropus. Green sand-piper. Bill dotted at the tip; legs greenish; back brown-green; belly and outer tail-feathers white. Another variety, with cinereous back and wings, and pale whitish spots. Inhabits Europe and America; is ten inches long; solitary; and smells of musk. Indigenous to England.

7. T. hypoleucos. Common sand-piper. Bill smooth; legs livid; body cinereous, with black stripes; beneath white; back and wings greenish brown, with numerous narrow dusky lines; quill-feathers brown, and except the first with a white spot within; tail rounded, shining green brown. Inhabits Europe and America; common to our own country; seven and a half inches long; wags the tail, and lays four or five dirty yellowish eggs with pale spots, in banks.

8. T. canutus. Knot. Bill smooth; legs ashy; primary quill-feathers serrate; outermost tail-feather white, without spots; body above cinereous, beneath white. Inhabits England, Europe generally, and America; nine inches long; eggs flesh-colour, with crowded orange red spots: flesh delicious.

9. T. cinclus. Sanderling. Purre. Stint. Bill and legs black; body and rump grey and brown: a second variety with brown legs. The breast and belly white in both. Inhabits England, Europe generally, and America: seven and a half inches long.

TRINIDAD, an island on the N.E. coast of Terra Firma, separated from Paria on the S. by a channel about ten miles over, and from Cumana on the W. by the gulf of Paria, the N. entrance into which is called Boca del Drago (Dragon's Mouth) on account of the adverse currents and tempestuous waves encountered here, when this island, with the neighbouring continent, was discovered by Columbus in 1498. It is 90 miles long and 50 broad; produces sugar, cotton, maize, fine tobacco, indigo, and fruit; but the air is unhealthy. It was taken in 1595, by sir Walter Raleigh, and in 1676, by the French, who plundered and left it. In 1797, it was captured by the English, and afterward ceded to them by the treaty of Amiens. The capital is Port d'Espagne, on the gulf of Paria, near the Boca. Lon. 61. 30 W. Lat. 10. 0 N.

The most remarkable phænomenon appertaining to the natural history of this island is its enormous Pitch Lake, the material of which has now a chance of being convertible to most valuable nautical and economical purposes. The whole history of this phænomenon is truly curious, and we copy therefore with much pleasure the following accurate description of Dr. Nugent from the first volume of the Geological Transactions.

“ Being desirous to visit the celebrated lake of pitch, previously to my departure from the island of Trinidad, I embarked with that intention in the month of October, 1807, in a small vessel at Port Spain. After a pleasant sail of about thirty miles down the gulf of Paria, we arrived at the point la Braye, so called by the French, from its charasteristic feature. It is a considerable headland, about eighty feet above the level of the sea, and perhaps two miles long and two broad. We landed on the southern side of the point, at the plantation of Mr. Vessigny: as the boat drew near the shore, I was struck with the appearance of a rocky bluff or small promontory of a reddish-brown colour, very different from the pitch which I had expected to find on the whole shore. Upon examining this spot, I found it composed of a substance corresponding to the porcelain jasper of mineralogists, generally of a red colour where it had been exposed to the weather, but of light slate-blue in the interior; it is a very hard stone with a conchoidal fracture, some degree of lustre, and is perfectly opake even at the edges; in some places, from the action of the air, it was of a reddish or yellowish-brown, and an earthy appearance. I wished to have devoted more time to the investigation of what in the language of the Wernerian school is termed the geognostic relations of this spot, but my companions were anxious to proceed. We ascended the hill, which was entirely composed of this rock, to the plantation, where we procured a negro guide, who conducted us through a wood about three quarters of a mile. We now perceived a strong sulphureous and pitchy smell, like that of burning coal, and soon after had a view of the lake, which at first sight appeared to be an expanse of still water, frequently interrupted by clumps of dwarf trees or islets of rushes and shrubs: but on a nearer approach we found it to be in reality an extensive plain of mineral pitch, with frequent crevices and chasms filled with water. The singularity of the scene was altogether so great, that it was some time before I could recover from my surprise so as to investigate it minutely. The surface of the lake is of the colour of ashes, and at this season was not polished or smooth so as to be slippery; the hardness or consistence was such as to bear any weight; and it was not adhesive, though it partially received the impression of the foot; it bore us without any tremulous motion whatever, and several head of cattle were browsing on it in perfect security. In the dry season, however, the surface is much more yielding, and must be in a state approaching to fluidity, as is shown by pieces of recent wood and other substances being enveloped in it. Even large branches of trees which were a foot above the level, had in some way become enveloped in the bituminous matter. The insterstices or chasms are very numerous, ramifying and joining in every direction, and in the wet season, being filled with water, present the only obstacle to walking over the surface: these cavities are generally deep in proportion to their width, some being only a few inches in depth, others several feet, and many almost unfathomable: the water in them is good, and uncontaminated by the pitch; the people of the neighbourhood derive their supply from this source, and refresh themselves by bathing in it; fish are caught in it, and particularly a very good species of mullet. The arrangement of the chasms is very singular: the sides, which of course are formed of the pitch, are invariably shelving from the surface, so as nearly to meet at the bottom, but then they bulge out towards each other with a considerable degree of convexity. This may be supposed to arise from the tendency in the pitch slowly to coalesce, whenever softened by the intensity of the sun's rays. These crevices are known occasionally to close up entirely, and we saw many marks or seams from this cause. How these crevices originate it may not be so easy to explain. One of our party suggested that the whole mass of pitch might be supported by the water which made its way through accidental rents; but in the solid state it is of greater specific gravity than water, for several bits thrown into one of the pools immediately sank. The lake (I call it so, because I think the common name appropriate enough) contains many islets covered with long grass and shrubs, which are the haunts of birds of the most exquisite plumage, as the pools are of snipe and plover. Alligators are also said to abound here; but it was not our lot to encounter any of these animals. It is not easy to state precisely the extent of this great collection of pitch; the line between it and the neighbouring soil is not always well defined, and indeed it appears to form the substratum of the surrounding tract of land. We may say, however, that it is bounded on the north and west sides by the sea, on the south by the rocky eminence of porcelain jasper before mentioned, and on the east by the usual argillaceous soil of the country; the main body may perhaps be estimated at three miles in circumference; the depth cannot be ascertained, and no subjacent rock or soil can be discovered. Where the bitumen is slightly covered by soil, there are plantations of cassava, plantains, and pine-apples, the last of which grow with luxuriance and attain to great perfection. There are three or four French and one English sugar estates in the immediate neighbourhood: our opinion of the soil did not, however, coincide with that of Mr. Anderson, who in the account he gave some years ago thought it very fertile. It is worthy of remark, that the main body of the pitch, which may properly be called the lake, is situated higher than the adjoining land, and that you descend by a gentle slope to the sea, where the pitch is much contaminated by the sand of the beach. During the dry season, as I have before remarked, this pitch is much softened, so that different bodies have been known slowly to sink into it: if a quantity be cut out, the cavity left will be shortly filled up: and I have heard it related, that when the Spaniards undertook formerly to prepare the pitch for economical purposes, and had imprudently erected their caldrons on the very lake, they completely sank in the course of a night, so as to defeat their intentions. Numberless proofs are given of its being at times in this softened state: the negro houses of the vicinage, for instance, built by driving posts in the earth, frequently are twisted or sunk on one side. In many places it seems to have actually overflown like lava, and presents the wrinkled appearance which a sluggish substance would exhibit in motion.

“This substance is generally thought to be the asphaltum of naturalists: in different spots, however, it presents different appearances. In some parts it is black, with a splintery conchoidal fracture, of considerable specific gravity, with little or no lustre, resembling particular kinds of coal, and so hard as to require a severe blow of the hammer to detach or break it; in other parts, it is so much softer, as to allow one to cut out a piece in any form with a spade or hatchet, and in the interior is vesicular and oily: this is the character of by far the greater portion of the whole mass; in one place, it bubbles up in a perfectly fluid state, so that you may take it up in a cup; and I am informed that in one of the neighbouring plantations there is a spot where it is of a bright colour, shining, transparent and brittle, like bottle-glass or resin. The odour in all these instances is strong, and like that of a combination of pitch and sulphur. No sulphur, however, is any where to be perceived; but from the strong exhalation of that substance, and the affinity which is known to exist between the fluid bitumens and it, much is, no doubt, contained in a state of combination: a bit of the pitch held in the candle melts like sealing-wax and burns with a light flame, which is extinguished whenever it is removed, and on cooling the bitumen hardens again. From this property it is sufficiently evident that this substance may be converted to many useful purposes, and accordingly it is universally used in the country wherever pitch is required; and the reports of the naval officers who have tried it are favourable to its more general adoption: it is requisite merely to prepare it with a proportion of oil, tallow, or common tar, to give it a sufficient degree of fluidity. In this point of view, this lake is of vast national importance, and more especially to a great maritime power. It is indeed singular that the attention of government should not have been more forcibly directed to a subject of such magnitude: the attempts that have hitherto been made to render it extensively useful have for the most part been only feeble and injudicious, and have consequently proved abortive. This vast collection of bitumen might in all probability afford an inexhaustible supply of an essential article of naval stores, and being situated on the margin of the sea could be wrought and shipped with little inconvenience or expense. It would, however, be great injustice to sir Alexander Cochrane not to state explicitly that he has at various times, during his long and active command on the Leeward Island station, taken considerable pains to insure a proper and fair trial of this mineral production for the highly important uses of which it is generally believed to be capable. But whether it has arisen from certain perverse occurrences, or from the prejudice of the mechanical superintendents of the colonial dock-yards, or really, as some have pretended, from an absolute unfitness of the substance in question; the views of the gallant admiral have, I believe, been invariably thwarted, or his exertions rendered altogether fruitless. I was at Antigua in 1809, when a transport arrived laden with this pitch for the use of the dock-yard at English Harbour: it had evidently been hastily collected with little care or zeal from the beach, and was of course much contaminated with sand and other foreign substances. The best way would probably be to have it properly prepared on the spot, and brought to the state in which it may be serviceable, previously to its exportation. I have frequently seen it used to pay the bottoms of small vessels, for which it is particularly well adapted, as it preserves them from the numerous tribe of worms so abundant in tropical countries. There seems indeed no reason why it should not, when duly prepared and attenuated, be applicable to all the purposes of the petroleum of Zante, a well-known article of commerce in the Adriatic, or that of the district in Burmah, where 400,000 hogsheads are said to be collected annually.

“ It is observed by captain Mallet, in his Short Topographical Sketch of the Island, that ‘ near cape la Brea (la Braye), a little to the south-west, is a gulf or vortex, which in stormy weather gushes out, raising the water five or six feet, and covers the surface for a considerable space with petroleum or tar:’ and he adds, that ‘ on the east coast in the bay of Mayaro, there is another gulf or vortex similar to the former, which in the months of March and June produces a detonation like thunder, having some flame with a thick black smoke, which vanishes away immediately: in about twenty-four hours afterwards is found along the shore of the bay a quantity of bitumen or pitch, about three or four inches thick, which is employed with success.’ Captain Mallet likewise quotes Gumilla, as stating in his Description of the Orinoco, that about seventy years ago ‘ a spot of land on the western coast of this island, near half way between the capital, an Indian village sank suddenly, and was immediately replaced by a small lake of pitch, to the great terror of the inhabitants.’

“ I have had no opportunity of ascertaining personally whether these statements are accurate, though sufficiently probable from what is known to occur in other parts of the world; but I have been informed by several persons that the sea in the neighbourhood of la Braye is occasionally covered with a fluid bitumen, and in the south-eastern part of the island there is certainly a similar collection of this bitumen, though of less extent, and many small detached spots of it are to be met with in the woods: it is even said that an evident line of communication may thus be traced between the two great receptacles. There is every probability, that in all these cases the pitch was originally fluid, and has since become inspissated by exposure to the air, as happens in the Dead Sea and other parts of the East.

“ It is for geologists to explain the origin of this singular phenomenon, and each sect will doubtless give a solution of its difficulty according to its peculiar tenets. To frame any very satisfactory hypothesis on the subject would require a more exact investigation of the neighbouring country, and particularly to the southward and eastward, which I had not an opportunity of visiting. And it must be remembered that geological inquiries are not conducted here with that facility which they are in some other parts of the world: the soil is almost universally covered with the thickest and most luxuriant vegetation, and the stranger is soon exhausted and overcome by the scorching rays of a vertical sun. Immediately to the southward, the face of the country, as seen from la Braye, is a good deal broken and rugged, which Mr. Anderson attributes to some convulsion of nature from subterranean fires, in which idea he is confirmed by having found in the neighbouring woods several hot springs. He is indeed of opinion that this tract has experienced the effects of the volcanic power, which, as he supposes, elevated the great mountains on the main and the northern side of the island. The production of all bituminous substances has certainly with plausibility been attributed to the action of subterranean fires on beds of coal, being separated in a similar manner as when effected by artificial heat, and thus they may be traced through the various tranformations of vegetable matter. I was accordingly particular in my inquiries with regard to the existence of beds of coal, but could not learn that there was any certain trace of that substance in the island; and though it may exist at a great depth, I saw no strata that indicate it. A friend, indeed, gave me specimens of a kind of bituminous shale mixed with sand, which he brought from Point Cedar, about twenty miles distant, and I find Mr. Anderson speaks of the soil near the pitch lake containing burnt cinders, but I imagine he may have taken for them the small fragments of the bitumen itself.

“ An examination of this tract of country could not fail, I think, to be highly gratifying to those who embrace the Huttonian theory of the earth; for they might behold the numerous branches of one of the largest rivers of the world (the Orinoco) bringing down so amazing a quantity of earthy particles as to discolour the sea in a most remarkable manner for many leagues distant; they might see these earthy particles deposited by the influence of powerful currents on the shores of the gulf of Paria, and particularly on the western side of the island of Trinidad; they might there find vast collections of bituminous substances, beds of porcelain jasper and such other bodies as may readily be supposed to arise from the modified action of heat on such vegetable and earthy materials as the waters are known actually to deposit. They would further perceive no very vague traces of subterranean fires, by which these changes may have been effected and the whole tract elevated above the ordinary level of the general loose soil of the country: as for instance, hot springs, the vortices above mentioned, the frequent occurrence of earthquakes, and two singular semi-volcanic mounds at Point Icaque, which, though not very near, throw light on the general character of the country. Without pledging myself to any particular system of geology, I confess an explanation similar to this appears to me sufficiently probable, and consonant with the known phenomenona of nature. A vast river, like the Orinoco, must for ages have rolled down great quantities of woody and vegetable bodies, which from certain causes,—as the influence of currents and eddies,—may have been arrested and accumulated in particular places; they may there have undergone those transformations and chemical changes which various vegetable substances similarly situated have been proved to suffer in other parts of the world. An accidental fire, such as is known frequently to occur in the bowels of the earth, may then have operated in separating and driving off the newly formed bitumen more or less combined with siliceous and argillaceous earths, which forcing its way through the surface, and afterwards becoming inspissated by exposure to the air, may have occasioned such scenes as I have ventured to describe. The only other country accurately resembling this part of Trinidad, of which I recollect to have read, is that which borders on the gulf of Taman in Crim Tartary: from the representation of travellers, springs of naphtha and petroleum equally abound, and they describe volcanic mounds precisely similar to those of Point Icaque. Pallas's explanation of their origin seems to me very satisfactory; and I think it not improbable that the river Don and sea of Azof may have acted the same part in producing these appearances in the one case, as the Orinoco and gulf of Paria appear to have done in the other. It may be supposed that the destruction of a forest or perhaps even a great savanna on the spot, would be a more obvious mode of accounting for this singular phenomenon; but, as I shall immediately state, all this part of the island is of recent alluvial formation, and the land all along this coast is daily receiving a considerable accession from the surrounding water. The pitch lake, with the circumjacent tract, being now on the margin of the sea, must in like manner have had an origin of no very distant date; besides, according to the above representation of captain Mallet, and which has been frequently corroborated, a fluid bitumen oozes up and rises to the surface of the water on both sides of the island, not where the sea has encroached on and overwhelmed the ready-formed land, but where it is obviously in a very rapid manner depositing and forming a new soil.

"From a consideration of the great hardness, the specific gravity, and the general external characters of the specimens submitted a few years ago to the examination of Mr. Hatchett, that gentleman was led to suppose that a considerable part of the aggregate mass at Trinidad was not pure mineral pitch or asphaltum, but rather a porous stone of the argillaceous genus, much impregnated with bitumen. Two specimens of the more compact and earthy sort, analysed by Mr. Hatchett, yielded about 32 and 36 per cent. of pure bitumen: the residuum in the crucible consisted of a spongy, friable and ochraceous stone; and 100 parts of it afforded, as far as could be determined by a single trial, of silica 60, alumina 10, oxyd of iron 10, carbonaceous matter by estimation 11; not the smallest traces of lime could be discovered; so that the substance has no similarity to the bituminous limestones which have been noticed in different parts of the world. I have already remarked, that this mineral production differs considerably in different places. The specimens examined by Mr. Hatchett by no means correspond in character with the great mass of the lake, which, in most cases, would doubtless be found to be infinitely more free from combination with earthy substances; though from the mode of origin which I have assigned to it, this intermixture may be regarded as more or less unavoidable. The analysis of the stone after the separation of the bitumen, as Mr. Hatchett very correctly observes, accords with the prevalent soil of the country; and I may add, with the soil daily deposited by the gulf, and with the composition of the porcelain jasper in immediate contact with the bituminous mass.

"All the country which I have visited in Trinidad is either decidedly primitive or alluvial. The great northern range of mountains which runs from east to west, and is connected with the highlands of Paria on the continent by the islands at the Bocas, consists of gneiss, of mica slate containing great masses of quartz, and in many places approaching so much to the nature of talc as to render the soil quite unctuous by its decomposition, and of compact blueish grey limestone, with frequent veins of white crystallized carbonat of lime. From the foot of these mountains, for many leagues to the southward, there is little else than a thick fertile argillaceous soil, without a stone or a single pebble. This tract of land, which is low and perfectly level, is evidently formed by the *detritus* of the mountains, and by the copious tribute of the waters of the Orinoco, which being deposited by the influence of currents, gradually accumulates; and in a climate where vegetation is astonishingly rapid, is speedily covered with the mangrove and other woods. It is accordingly observed, that the leeward side of the island constantly encroaches on the gulf, and marine shells are frequently found on the land at a considerable distance from the sea. This is the character of Naparima and the greater part of the country I saw along the coast to la Braye. It is not only in forming and extending the coast of Trinidad, that the Orinoco exerts its powerful agency; co-operating with its mighty sister flood, the Amazons, it has manifestly formed all that line of coast and vast extent of country included between the extreme branches of each river. To use the language of a writer in the Philosophical Transactions of Edinburgh:—'If you cast your eye upon the map, you will observe from Cayenne to the bottom of the gulf of Paria this immense tract of swamp, formed by the sediment of these rivers, and a similar tract of shallow muddy coast, which their continued operation will one day elevate. The sediment of the Amazons is carried down thus to leeward (the westward) by the constant currents which set along from the southward and the coast of Brazil. That of the Oroonoko is detained and allowed to settle near its mouths by the opposite island of Trinidad, and still more by the mountains on the main, which are only separated from that island by the Bocos del Drago. The coast of Guiana has remained, as it were, the great eddy or resting-place for the washings of great part of South America for ages; and its own comparatively small streams have but modified here and there the grand deposit."

Trinidad, a seaport in Mexico, in the province of Guatimala, on a bay of the Pacific ocean. It is a place of great trade, the harbour being the nearest landing to Guatimala, for all merchandise that comes from Mexico and Peru. The town is nine miles from the harbour, and 110 E.S.E. of Guatimala. Lon. 90. 40 W. Lat. 14. 0 N.

Trinidad, a town of Mexico, in Veragua, near the mouth of a river which enters the Caribbean sea, 20 miles E.S.E. of Conception. Lon. 81. 23 W. Lat. 8. 40 N.

Trinidad, a seaport of Cuba, in a bay on the south part of the island, 40 miles S.W. of Spiritu Santo. Lon. 80. 3 W. Lat. 21. 58 N.

TRINIDADA, three rocky islets in the Atlantic ocean, 200 leagues E. of Spiritu Santo, in Brasil. The largest is not three miles in circumference, and the Portuguese keep a small garrison here to prevent a contraband trade with the Brasils. Lon. 29. 35 W. Lat. 20. 30 S.

TRINITARIANS, those who believe in the doctrine of the Trinity; being, as far as can be ascertained, a great majority of professing christians in all ages of the church.

TRINITATIS HERBA. See Hepatica nobilis.

TRINITY, in theology, the ineffable mystery of three persons in one God.

This doctrine is distinctly expressed in one clause of the Athanasian creed:—i. e. "The Father is God; the Son is God; the Holy Ghost is God; and yet they are not three Gods but one God." Hence, those who speak of the notion of the Trinity as a belief in *three* Gods, misrepresent the doctrine. Many writers have shown that the doctrine is sufficiently clear, sufficiently practical, and sufficiently insisted upon in scripture, to be regarded as a fundamental; and they may easily support their cause by referring to the judgment of the primitive churches with respect to this doctrine.

Some have endeavoured to prove that this is not a scripture verity; but they adopt a singular method of effecting their purpose. They either put an unnatural construction upon the passages in which divine attributes are ascribed to the Son and the Holy Spirit; or they obviously mistranslate them; or they assert that the passages are spurious, and ought to be expunged from the sacred canon.

Others, as Dr. Priestley, in his History of Early Opinions, have endeavoured to prove that the doctrine was not held in the early ages. But his proof rests in great measure upon a *petitio principii*. And besides this, his work abounds in the grossest mutilation of passages, and misrepresentation of the sentiments of the fathers, and manifests the most disgraceful ignorance of Greek. It is now well known that he had never read the early books from which he quotes; but merely pointed out passages, as he thought they would suit, by means of an index; and that if he had read only a few lines earlier or later than the passage cited, he would have found it perfectly to contradict the purpose for which he adduced it. In the opinion of every competent and impartial judge of ecclesiastical antiquity, the doctor has received from bishop Horsley the severest and justest castigation which a rash and arrogant invader of another's province ever received in the fields of controversy. Yet Mr. Belsham, the present head of the Socinians, has the face to say, that "Dr. Priestley came off with the victory!"

A third class of persons reject the doctrine, because it is incomprehensible; forgetting that every thing relating to the attributes of Deity is equally so. God is every where present, yet so as not to exclude other beings: is not this mysterious? He existed from before all worlds, and will continue to exist after the earth is destroyed; yet he is never to be considered as either older or younger: is not this mysterious? The attributes of Deity, then, are utterly incomprehensible, when contemplated in relation to space and to time; what reason then can there be to imagine that they should be in no respect incomprehensible when contemplated in reference to number?

The clause from Athanasius above quoted consists of five distinct propositions. 1. The Father is God. 2. The Son is God. 3. The Holy Ghost is God. 4. Yet they are not three Gods. 5. But one God.

Socinians believe and admit the first of these propositions. Is it because they fully comprehend the terms in which it is expressed? Surely not. Is it because they can define fully what is meant by the single word God? Surely not. They believe, then, what they do not comprehend in relation to God: yet they reject much that is revealed with regard to God, because they cannot comprehend it. Does it never strike them that there is great inconsistency in all this? And that, as men of reason, they should either recede still farther from the notions held by the majority of christians, and reject the belief of God altogether; or advance more into contact with them, and believe whatever is revealed on divine authority, however incomprehensible it may to them appear?

For able defences of the doctrine now before us, the reader may consult the works of Waterland and Jones on the Trinity; a circular letter on the same subject, by the late Rev. Rob. Hall, of Arnsby; and an Essay on the Trinity, just published, by Mr. Thomas Morton. The latter work, consisting of only 46 pages, is a most acute metaphysical disquisition, developing very ably the principles on which mysterious and apparently contradictory propositions may be believed.

TRINITY HOUSE, a kind of college belonging to a company or corporation of seamen, who, by the king's charter, have power to take cognizance of those persons who destroy sea-marks, and to get reparation of such damages; and to take care of other things belonging to navigation. At present, many in the first rank of society are members of that community. The master, wardens, and assistants of the Trinity House may set up beacons, and marks for the sea, in such places, near the coasts or forelands, as to them shall seem meet. By a statute of queen Elizabeth, no steeple, trees, or other things standing as sea-marks, shall be taken away or cut down, upon pain that every person guilty of such offence shall forfeit 100*l*. and if the person offending be not possessed of the value, he shall be deemed convict of outlawry.

TRINITY (Fraternity of), a religious society instituted at Rome, by St. Philip Neri, in 1548. These religious were appointed to take care of the pilgrims who came to visit the tombs of St. Peter and St. Paul. The society originally consisted of only 15 religious, who assembled on the first Sunday of every month in the church of St. Saviour del Campo, to hear the exhortations of the founder; after whose death pope Paul IV. gave the fraternity the church of St. Benedict, near which they have since built a large hospital, for the reception of pilgrims. The fraternity is one of the most considerable in Rome, and most of the nobility of both sexes have been members of it.

TRINITY, a seaport on the N. side of Martinico, with a spacious and safe harbour, and a considerable trade. Lon. 61. 8 W. Lat. 14. 53 N.

TRI'NKET. *s.* 1. Toys; ornaments of dress; superfluities of decoration (*Swift*). 2. Things of no great value; tackle; tools (*L'Estrange*).

TRIO'BOLAR. *a.* (*triobolaris*, Latin.) Vile; mean; worthless (*Cheynel*).

TRINOMIAL, or TRINOMIAL ROOT, in mathematics, is a root consisting of three parts connected together by the signs + or —, as $x + y + z$, or $a + b - c$. See BINOMIAL and ROOT.

TRIO, in music, a part of a concert wherein three persons sing; or more properly, a musical composition consisting of three parts. Trios are the finest kinds of composition, and these are what please most in concerts.

TRIŒCIA. (τρεις, and οικος, a house.) The name of the third order in the class polygamia; and signifying that there are hermaphrodite, male and female flowers of the same species on three distinct individuals. See BOTANY.

TRIOPTERIS, in botany, a genus of the class decandria, order trigynia. Calyx triparted, with two mellifluous pores at the base of each on the outside; petals roundish, with claws; filaments cohering at the base; capsules three, one-seeded, three or four winged. Eight species; natives of the East or West Indies.

TRIOSTEUM, in botany, a genus of the class pentandria, order monogynia. Corol one-petalled, nearly equal; calyx as long as the corol; berry three-celled, one-seeded, inferior. Three species; natives of North America or Madagascar.

To TRIP. *v. a.* (*treper*, Fr. *trippen*, Dutch.) 1. To supplant; to throw by striking the feet from the ground by a sudden motion (*Shakspeare*). 2. To strike from under the body (*Shakspeare*). 3. To catch; to detect (*Shakspeare*).

To TRIP. *v. a.* 1. To fall by losing the hold of the feet. 2. To fail; to err; to be deficient (*Dryden*). 3. To stumble; to titubate (*Locke*). 4. To run lightly (*Dryden*). 5. To take a short voyage.

TRIP. *s.* (from the verb.) 1. A stroke or catch by which the wrestler supplants his antagonist (*Addison*). 2. A stumble by which the foothold is lost. 3. A failure; a mistake 4. A short voyage or journey (*Pope*).

TRI'PARTITE. *a.* (*tripartite*, Fr. *tripartitus*, Lat.) Divided into three parts; having three correspondent copies; relating to three parties (*Shakspeare*).

TRIPE. *s.* (*tripe*, Fr. *trippa*, Ital. and Span.) 1. The intestines; the guts (*King*). 2. It is used in ludicrous language for the human belly.

TRI'PEDAL. *a.* (*tres* and *pes*, Lat.) Having three feet.

TRIPETALODEÆ. The name of the sixth order in Linnéus's Fragments; and of the fifth in his Natural Orders.

TRIPE'TALOUS. *a.* (τρεις and ϖεταλον.) Having a flower consisting of three leaves.

TRIPHANE. (*spodumene*, D'Andrada and Werner.) In mineralogy, a substance of an apple-green or greenish-white colour: it occurs in mass; longitudinal fracture shining, cross fracture glistening with a pearly lustre. Its fragments are indeterminate, or in the form of very oblique rhombs. It is translucent, moderately hard, and easily frangible. Specific gravity 3.21. Before the blow-pipe it becomes yellow, and splits into thin plates, and then melts into a transparent greyish glass. It has hitherto been found only in the mines of Uton, near Dalero in Sweden, in veins with quartz and black mica.

TRI'PHTHONG. *a.* (*triphthongue*, Fr. τρεις and φθογγη.) A coalition of three vowels to form one sound: as, *eau; eye.*

TRI'PLE. *a.* (*triple*, Fr. *triplex*, *triplus*, Lat.) 1. Threefold; consisting of three conjoined (*Waller*). 2. Treble; three times repeated (*Burnet*).

To Tri'ple, *v. a.* (from the adjective.) 1. To treble; to make thrice as much, or as many (*Hooker*). 2. To make threefold (*Dryden*).

Triple, or Triple time, in music, a time consisting of three measures in a bar; the two first of which are beaten with the hand or foot down, and the third marked by its elevation. There were formerly in use no less than six different triple measures: first, that of three breves in a bar, denoted by the figure 3; secondly, that of three semibreves in a bar, the sign of which was $\frac{3}{1}$; thirdly, that of three minims in a bar, marked by ${}_{2}$; fourthly, that of three crotchets in a bar, implied by $\frac{3}{4}$; fifthly, that of three quavers in a bar, signified by $\frac{3}{8}$; and, sixthly, that of three semiquavers in a bar, expressed by $\frac{3}{16}$. But at present we only employ three different triples; that of three minims, that of three crotchets, and that of three quavers. See Music.

Triple progression, an expression in old music, implying a series of perfect fifths. A progression of sounds thus explained by theorists; let any sound be represented by unity, or the number 1; and as the third part of a string has been found to produce the twelfth, or octave of the fifth above the whole string, a series of fifths may be represented by a triple geometric progression of numbers, continually multiplied by 3; as 1, 3, 9, 27, 81, 243,729; and these terms may be equally supposed to represent twelfths, or fifths, either ascending or descending: for whether we divide by 3, or multiply by 3, the terms will either way be in the proportion of a twelfth, or octave to the fifth.

Triple salts, in chemistry, salts composed of an acid combined with two distinct bases at the same time; thus tartaric acid combines at once with potash and soda. These substances constitute a very large and important family; and appear to be subject to the following laws, as lately pointed out by M. Gay-Lussac to the Society of Arcueil.

1. In triple salts the acid is commonly divided between the bases in two equal proportions. This is the case in the triple tartrats and oxalats; in the ammoniaco-magnesian sulphat; in the triple sulphat of zinc and ammonia, &c.

2. That in a triple compound the elements united two and two form possible binary compounds. For example, the nitrat of ammonia, which is composed of oxygen, nitrogen, and hydrogen, when decomposed by fire, yields water, and gaseous oxyd of nitrogen: while, on the other hand, this salt is the result of two binary compounds, nitric acid and ammonia.

3. That the vegetable and animal substances, which are composed of three or four different matters, also give rise to binary compounds, that are possible, or generally known.

4. That we may form an idea of the different nature of several substances containing the same elements and in the same proportions; if we admit, that the binary products of the elements combine in different ways with each other, or merely with one of the elements.

5. That we may imagine so many more compounds containing the same elements in the same quantities, as we can conceive the binary combinations, formed by the elements of these compounds, to be more numerous.

6. That salts, or other compounds, being neutral, though formed of an acid containing an excess of oxygen, and a base that is still combustible: we may admit, that the base saturates the excess of oxygen of the acid; and that hence results a point of saturation, well adapted to determine the capacity of combustibles for oxygen. For instance, the neutral nitrat of ammonia, being decomposed by heat, yields as products water, which is neutral, and gaseous oxyd of nitrogen, which must be neutral also.

7. That nitrous gass and oxygen gass, in combining to produce nitrous acid gass, experience an apparent condensation of bulk, which is precisely half the total bulk of the two gasses, whence it follows, that the density of nitrous acid gass is 2.10633, that of atmospheric air being 1.

TRI'PLET. *s.* (from *triple.*) 1. Three of a kind (*Swift*). 2. Three verses rhiming together (*Dryden*).

TRI'PLICATE. *a.* (from *triplex*, Latin.) Made thrice as much (*Harris*).

Triplicate ratio, the ratio which cubes bear to one another.

This ratio is to be distinguished from triple ratio, and may be thus conceived. In the geometrical proportions 2, 4, 8, 16, 32, as the ratio of the first term (2) is to the third (8), duplicate of the first to the second, or of the second to the third, so the ratio of the first to the fourth is said to be triplicate of the ratio of the first to the second, or of that of the second to the third, or of that of the third to the fourth, as being compounded of three equal ratios. See Ratio.

TRIPLICA'TION. *s.* (from *triplicate.*)

The act of trebling, or adding three together (*Glanville*).

TRIPLI'CITY. *s.* (*triplicité*, French; from *triplex*, Latin.) Trebleness; state of being threefold (*Watts*).

TRIPLINERVE. In which they meet above (supra) or short of the base.

"I must confess," says professor Martyn, "that I do not see how these terms are expressive of such distinctions; which are given in Term. Bot.—I should have conceived that by the last of them we were to understand a leaf having three-fold nerves, or running three and three together: and thus Dr. Berkenhout has explained it."

TRIPLY-TERNATE. Triternate.

TRIPOD, in antiquity, a famed sacred seat or stool, supported by three feet, whereon the priests and sybils were placed to render oracles. It was on the tripod that the gods were said to inspire the Pythias with that divine fury and enthusiasm wherewith they were seized at the delivery of their predictions.

Before the oracle of Apollo came to be fixed at Delphos, the place was nothing more than a common, and the goats which were grazing about there coming to a den, large before, with a little mouth at top, and looking in, fell to skipping and making an odd noise. The goat-herd, named Coretas, as Plutarch informs us, ran to the place to see what was the matter with his flock, and fell into the same frolic, and likewise into a fit of prophesying: and so it fared with many others, who went afterwards to visit the place. Many were trangled, says Tully, with *terræ anhelitu*, fumes of the earth. Vid. Diodor. lib. 16. Upon this hole was the tripod placed, and a maid set upon it was consecrated for a priestess, who received her inspiration from below. These *belly prophets*, who delivered themselves in a tone like a speaking trumpet, are referred to by Isaiah, ch. viii. ver. 19. and ch. xxix. ver. 4.

TRIPODIAN. (From the Greek.) A stringed instrument said to have been invented by Pythagoras the Zacynthian, which, on account of the difficulty of its performance, continued in use but for a short time. It resembled in form the Delphic tripod, whence it had its name. The legs were equidistant, and fixed upon a moveable base that was turned by the foot of the player; the strings were placed between the legs of the stool; the vase at the top served for the purpose of a sound-board, and the strings of the three sides of the instrument were tuned to three different modes, the Doric, Lydian, and Phrygian. The performer sat on a chair made on purpose. Striking the strings with the fingers of the left hand, and using the plectrum with the right, at the same time turning the instrument with his foot to whichever of the three modes he pleased; so that by great practice he was enabled to change the modes with such readiness and velocity, that those who did not see him would imagine they heard three different performers playing in three different modes.

TRIPOLI, a country of Barbary, bounded on the N. by the Mediterranean, E. by Barca, S. by Fezzan, and W. by Biledulgerid and Tunis. It is not very fertile, and the E. part is quite a desert. It is 925 miles along the coast, but the breadth is various. It had the title of a kingdom, but is now a republic, governed by a dey, under the protection of the Turks.

TRIPOLI, a city and seaport of Barbary, capital of a country of the same name, with a castle and a fort. The inhabitants are noted pirates. It was taken by emperor Charles V. who settled the knights of Rhodes here; but they were expelled by the Turks in 1551. It was formerly very flourishing, and has now some trade in ashes, ostriches feathers, and skins; but they gain more by the christians taken at sea; for they either set high ransoms on them, or sell them for slaves. Tripoli is seated on the Mediterranean, surrounded by a wall, 275 miles S.E. of Tunis, and 570 E.S.E. of Algiers. Lon. 13. 5 E. Lat. 32. 54 N.

TRIPOLI, a town of Syria, on the Mediterranean, defended by a citadel. There is one handsome mosque, and all the houses have fountains belonging to them. Before it is a sand-bank, so rapidly increasing that the harbour will probably soon be choked up. It is the residence of a bashaw, who also governs the territory about it, where there is a great number of mulberry-trees, and other fruits, which enable them to carry on a silk manufacture in the town. It is 90 miles N.W. of Damascus, and 120 S. of Scanderoon. Lon. 36. 20 E. Lat. 34. 50 N.

TRIPOLI, in mineralogy, a species of argil, for which see ARGILLA.

TRI'PPER. *s.* (from *trip*.) One who trips.

TRI'PPING. *a.* (from *trip*.) Quick; nimble (*Milton*).

TRI'PPING. *s.* (from *trip*.) Light dance (*Milton*).

TRI'PPINGLY. *ad.* (from *tripping*.) With agility; with swift motion (*Shakspeare*).

TRIPSACUM, in botany, a genus of the class monoecia, order triandria. Male: calyx a four-flowered glume; corol a membranaceous glume. Fem.: calyx a glume with perforated sinuses; corol a two-valved glume; styles two; seed one. Two species; West Indian grasses.

TRIPTILION, in botany, a genus of the class syngenesia, order polygamia æqualis. Receptacle villous; down awned, the awns feathery at top; calyx imbricate. One species only; a South American plant, with panicled stem and white flowers.

TRIPTOLEMUS, according to the more received opinion, was son of Celeus, king of Attica, by Neæra. He was born at Eleusis in Attica, and was cured in his youth of a severe illness by Ceres, who had been invited into the house of Celeus, as she travelled in quest of her daughter. To repay the kindnesses of Celeus, the goddess took particular notice of her son. She fed him with her own milk, and wished to make him immortal, but was prevented through the meddling curiosity of his mother. She, however, in compensation, taught him agriculture, and rendered him serviceable to mankind, by instructing him how to sow corn, and make bread. She also gave him her chariot, drawn by two dragons, in which he travelled all over the earth, and distributed corn to all the inhabitants of the world. At his return to Eleusis, Triptolemus restored Ceres her chariot, and established festivals and mysteries in honour of the deity. He reigned for some time, and after death received divine honours.

TRI'PTOTE. *s.* (*triptoton*, Latin.) A noun used but in three cases (*Clarke*).

TRIPU'DIARY. *a.* (*tripudium*, Lat.) Performed by dancing (*Brown*).

TRIPUDIA'TION. *s.* (*tripudium*, Latin.) Act of dancing.

TRIQUETRA OSSICULA, in anatomy. (*triquetrus*, from *tres*, three). Ossicular Wormiana. The triangular-shaped bones, which are found mostly in the course of the lambdoidal suture.

TRI'REME. *s.* (*triremis*, Latin.) A galley with three benches of oars on one side.

TRISECTION, the dividing a thing into three equal parts. The term is chiefly used in geometry, for the division of an angle into three equal parts. The trisection of an angle geometrically is one of those great problems whose solution has been so much sought for by mathematicians for 2000 years past; being, in this respect, on a footing with the famous quadrature of the circle, and the duplicature of the cube.

The ancients trisected an angle by means of the conic sections, and the book of inclinations; and Pappus enumerates several ways of doing it, in the fourth book of his Mathematical Collections, prop. 31, 32, 33, 34, 35, &c. He farther observes, that the problem of trisecting an angle is a solid problem, or a problem of the 3d degree, being expressed by the resolution of a cubic equation, in which way it has been resolved by Vieta, and others of the moderns.

TRISMUS. (τρισμος, from τριζω, to gnash). Locked jaw. See TETANUS.

TRISPAST, in mechanics, a machine with three pulleys, or an assemblage of three pulleys for raising of great weights.

TRIST, a small uninhabited island of New Spain, on the coast of Tabasco, in the bay of Campeachy, separated by a narrow channel on the E. from the isle of Port Royal. Lon. of the E. point 92. 45 W. Lat. 18. 0 N.

TRISTAN D'ACUNHA, an island in the S. Atlantic ocean, 15 miles in circumference. The land is extremely high, and rises gradually toward the centre of the island (where there is a lofty conical mountain) in ridges covered with trees of a moderate size and height. The coast is frequented by sea-lions, seals, penguins, and albatrosses. Lon. 11. 43 W. Lat. 37. 8 S.

TRISPERMOUS, in botany. Three-seeded.

TRISSAGO. (*quasi tristago*, from *tristis*, sad; because it dispels sadness.) The common germander, sometimes so called. See CHAMÆDRYS.

TRISSAGO PALUSTRIS. The water germander, occasionally so called. See SCORDIUM.

TRISU'LC. *s.* (*trisulcus*, Latin.) A thing of three points (*Brown*).

TRISYLLA'BICAL. *a.* (from *trisyllable.*) Consisting of three syllables.

TRISY'LLABLE. *s.* (*trisyllaba*, Latin.) A word consisting of three syllables.

TRITE. *a.* (*tritus*, Lat.) Worn out; stale; common; not new (*Rogers*).

TRITE, a Greek term, signifying *three* or *third.* Three chords of the ancient system were called by this name, from their actual situation in the tetrachords of which they respectively formed a part. See TRITE-DIEZEUGMENON, TRITE-HYPERBOLÆON, and TRITE-SYNEMMENON.

TRITE-DIEZEUGMENON. (From the Greek.) The third string of the diezeugmenon, or fourth tetrachord of the ancients, reckoning from the top. The sound of this string corresponded with our C above the bass-cliff.

TRITE-HYPERBOLÆON. (Greek.) The third string of the ancient hyperbolæon, or fifth tetrachord; and which answered to our G on the second line in the treble.

TRITE-SYNEMMENON. (From the Greek.) The third string, reckoning from the top of the third, or synemmenon, tetrachord; and which corresponded with our B flat above the fifth line in the bass.

TRI'TENESS. *s.* (from *trite.*) Staleness; commonness.

TRITHEI'SM. *s.* (τρεις and ϑεος.) The opinion which holds three distinct gods.

TRITICUM. Wheat. In botany, a genus of the class triandria, order digynia. Calyx two-valved, solitary, alternate, on a flexuous common receptacle, and containing three or more obtuse but pointed florets. Nineteen species: chiefly natives of Europe; one or two of Egypt and Barbary: some are annual, about an equal number perennial.

1. T. æstivum. Summer or spring wheat.
2. T. hybernum. Winter lammas, or common wheat.
3. T. compositum. Cone wheat.
4. . turgidum. Cone wheat.
5. T. Polonicum. Polish wheat.
6. T. spelta. Spelt wheat.
7. T. monococion. One-grained wheat.
8. T. Hispanicum. Spanish wheat.
9. T. prostratum. Trailing wheat-grass.
10. T. pumilum. Dwarf wheat-grass.

All these are annuals. What follow constitute the perennial tribe.

11. T. junceum. Rush-wheat-grass.
12. T. caninum. Dog-wheat-grass.
13. T. distichum. Double-wheat-grass.
14. T. repens. Couch-grass.
15. T. maritimum. Sea-wheat-grass.
16. T. tenellum. Tender wheat-grass.
17. T. unioloides. Linear spiked wheat-grass.

18. T. loliaceum. Loliaceous wheat-grass.

19. T. unilaterale. Unilateral wheat-grass.

The relative value of such of these as are most esteemed in cultivation, together with the best means of cultivating them, are given under the article Husbandry, to which this genus so essentially refers.

TRITOMA, in zoology, a genus of the class insecta, order coleoptera. Antennas clavate, the club perfoliate; lip emarginate; anterior feelers hatchet-shaped; shells as long as the body. Ten species, chiefly European; a few American; one or two Indian. The only species indigenous to England is tritoma bipustulata; black; the shells with a lateral scarlet spot at their base. It is found on tree-fungus.

TRITON, a sea deity, son of Neptune, by Amphitrite, or, according to some, by Celeno, or Salacia. He was very powerful among the sea deities, and could calm the sea and abate storms at pleasure. He is generally represented as blowing a shell; his body above the waist is like that of a man, and below, a dolphin. Many of the sea deities are called tritons.

Triton, in zoology, a genus of the class vermes, order mollusca. Body oblong; mouth with an involute, spiral proboscis; tentacles or arms twelve, six on each side, divided nearly to the base, the hind-ones cheliferous. One species only, triton littoreus, inhabiting Italy, in cavities of submarine rocks, and may be seen in various species of lepas, especially the anatifera, or duck-barnacle.

TRITONE, a dissonant interval, otherwise called a superfluous fourth: a kind of redundant third, consisting of three tones, two major and one minor, or more properly, of two tones and two semitones, one greater and one less, as from C to F sharp. The ratio of the tritone in numbers is as 45 : 32.

TRITONIS, a lake and river of Africa, near which Minerva had a temple, whence she is sirnamed Tritonis or Tritonia.

TRI'TURABLE. *a.* (*triturable*, French; from *triturate*.) Possible to be pounded or comminuted (*Brown*).

TRITURA'TION. *s.* (*trituration*, French.) Reduction of any substances to powder upon a stone with a muller; levigation (*Brown*).

TRIVENTO, a town of Naples, in Molise, with a bishop's see, seated on a hill, near the river Trigno, or Trino, 15 miles N. of Bogano, and 62 E. of Naples. Lon. 15. 37 E. Lat. 40. 50 N.

TRI'VET. *s.* (See Trevet.) Any thing supported by three feet (*Chapman*).

TRI'VIAL. *a.* (*trivialis*, Latin.) 1. Vile; worthless; vulgar; such as may be picked up in the highway (*Roscommon*). 2. Light; trifling; unimportant; inconsiderable (*Dryd. Rogers*).

Trivial names. Trivialia nomina. In botany, the common or vulgar names for the species of plants, which added to the name of the genus, form a complete denomination of the species. These were invented by Linnéus, and first used in the Pan Succus; afterwards in the Species Plantarum, and thenceforward in all his other works. Antecedently to this, what we now call the diagnosis, or specific character, seems to have been considered as the specific name, which see.

TRI'VIALLY. *ad.* (from *trivial.*) 1. Commonly; vulgarly (*Bacon*). 2. Lightly; inconsiderably.

TRI'VIALNESS. *s.* (from *trivial.*) 1. Commonness; vulgarity. 2. Lightness; unimportance.

TRIUMFETTA, in botany, a genus of the class dodecandria, order monogynia. Calyx five-leaved; petals five; capsule bristly, bursting into four. Eleven species; natives of the East or West Indies; chiefly shrubs, a few annuals. Two are cultivated in our own gardens.

1. T. lapula. Prickly-seeded triumfetta. A shrub rising six or seven feet high, bearing small flowers, yellow, with narrow petals. A native of Jamaica.

2. T. annua. Annual triumfetta. Rising two feet and a half high; with small yellow flowers in loose spikes at the top of the plant. A native of India.

Both require the warmth of the stove.

TRI'UMPH. *s.* (*triumphus*, Latin.) 1. Pomp with which a victory is publicly celebrated (*Bacon*). 2. State of being victorious (*Dryden*). 3. Victory; conquest (*Pope*). 4. Joy for success (*Milton*). 5. A conquering card, now called *trump*.

To Tri'umph. *v. n.* (*triumpho*, Latin.) 1. To celebrate a victory with pomp; to rejoice for victory (*Dryden*). 2. To obtain victory (*Knolles*). 3. To insult upon an advantage gained (*Shakspeare*).

TRIU'MPHAL. *a.* (*triumphalis*, Latin.) Used in celebrating victory (*Swift*).

Triu'mphal. *s.* (*triumphalia*, Latin.) A token of victory: not in use (*Milton*).

TRIU'MPHANT. *a.* (*triumphans*, Latin.) 1. Celebrating a victory (*South*). 2. Rejoicing, as for victory (*Milton*). 3. Victorious; graced with conquests (*Pope*).

TRIU'MPHANTLY. *ad.* (from *triumphant.*) 1. In a triumphant manner, in token of victory; joyfully, as for victory (*Granville*). 2. Victoriously; with success (*Shakspeare*). 3. With insolent exultation (*South*).

TRIU'MPHER. *s.* (from *triumph.*) One who triumphs (*Peacham*).

TRIUMVIRI, *reipublicæ constituendæ*, were three magistrates appointed equally to govern the Roman state with absolute power. These officers gave a fatal blow to the expiring independence of the Roman people, and became celebrated for their different pursuits, their ambition, and their various fortunes. The first triumvirate, B. C. 60, was in the hands of Julius Cæsar, Pompey, and Crassus, who, at the expiration of their office, kindled a civil war. The second and last triumvirate, B. C. 43, was under Augustus, Marc Antony, and Lepidus, and through them the Romans totally lost their liberty. Augustus disagreed with his colleagues, and after he had defeated them, he made himself absolute in Rome. The triumvirate was in full force at Rome for the space of about twelve years. There were also other inferior officers, called triumviri, among the Romans, who discharged different functions in the administration of the state. They were severally distinguished by the titles of capitales, nocturni, agrarii, monetales, triumviri, valetudinis, senatus legendi, and mensarii. They took cognizance of murders and robberies, and every thing in which slaves were concerned.

TRI'UNE. *a.* (*tres* and *unus*, Latin.) At once three and one (*Burnet*).

TRIXIS, in botany, a genus of the class syngenesia, order polygamia necessaria. Receptacle chaffy, downless; seeds villous at the top; florets of the ray three-cleft; calyx imbricate. Three species; herbs of the West Indies.

To TROAT. *v. a.* (with hunters.) To cry, as a buck does at rutting-time.

TROCAR. (corrupted from *trois quart*, French, from its prismatic form.) The name of an instrument used in tapping for the dropsy.

TROCH, in medicine, a tablet or lozenge. See TROCHISCUS.

TROCHAIC VERSE, in the Latin poetry, a kind of verse, so called, because the trochees chiefly prevail, as the iambus does in the iambic. It generally consists of seven feet and a syllable; the odd feet, for the most part, consist of trochees, though a trybraches is sometimes admitted, except in the seventh foot: these two feet are likewise used in the other places, as is also the spondæus, dactylus, and anapæstus. The following is an example:

1 2 3 4 5
Solus | *aut rex* | *aut po* | *eta* | *non quot* |
6 7 ½
annis | *nasci* | *tur.*

TROCHANTERS. (τροχαντηρ, from τρεχω, to run; because the muscles inserted into them perform the office of running.) Two processes of the thigh-bone, which are distinguished into the greater and lesser. See FEMUR.

TROCHEE. See TROCHAIC.

TROCHI'LICS. *s.* (τροχιλιον.) The science of rotatory motion (*Brown*).

TROCHILUS. Humming-bird. Honeysucker. In zoology, a genus of the class aves, order picæ. Bill subulate, filiform, tubular at the tip, longer than the head; upper mandible sheathing the lower; tongue filiform, the two threads coalescing, tubular; feet formed for walking. Sixty-five species: all American or West Indian birds, except one, trochilus Capensis, which inhabits the Cape of Good Hope. About half the species have a curved, and the other half a straight bill.

In forming this minute animal, nature appears to have been hesitating whether she would fabricate a bird or an insect. They are the least of the feathered tribe; they feed, like insects, on the nectar of flowers, particularly those with long tubes, which they extract, like bees, while on the wing, fluttering about the place, and making a humming noise: the legs and bill are very weak; the tail feathers are ten.

Of all animated beings the, humming-bird is perhaps the most elegant in form, and brilliant in its colours. Activity, rapidity, and richness of drapery, sometimes sparingly bestowed by nature on the other tenants of the air, she has heaped upon the humming-bird without measure. The emerald, ruby, and topáz sparkle on its apparel, which is never soiled by the dust, for in its aerial life it scarcely ever descends so low as to touch the grass. It flies from flower to flower, extracting their quintessence alone; and never quits a climate where perpetual spring renews without ceasing the delicious luxuries on which it banquets. It is seldom that the humming-bird retires from the intratropical regions; appearing successively to advance and recede with the sun on either side of the line, in pursuit of an uninterrupted summer.

The Indians, struck with the lustre and fire of its brilliant plumage, call it the sun-beam; and the Spaniards tomino, from its minute weight. The tongue resembles a section of a silken thread, and the bill has the appearance of a fine needle. The little eyes appear like sparks of a diamond, and the feathers of the wings are so delicate, as to look transparent.

The feet of this creature are so small, that they are scarcely perceptible. He uses them, indeed, but little; for he is continually employed in a humming and rapid flutter, in which the agitation of his wings are so quick, that they are altogether invisible. Like an inconstant lover, he hastens from flower to flower, to gratify his desires and multiply his enjoyments.

The courage and vivacity of these birds are nevertheless surprising. They pursue, with a furious audacity, birds twenty times their size; fasten themselves upon their body, and allow themselves to be carried away by their flight; while they are, in the mean while, pecking them with redoubled strokes of their bill, till their little wrath is appeased. They are solitary till the pairing season, when they engage busily, by pairs, in constructing with moss, lined with the down of the great mullein, a small, round, elegant nest, corresponding with the delicacy of their body. It is the female that completes this little cradle for her progeny, while the male charges himself with the task of bringing the materials, which are ingeniously knit into the consistency of a thick and soft piece of cloth. The whole fabric is attached to two leaves, or a single twig, of the citron or orange-tree. It is soon plenished with two small white eggs, of the size of a pea, which the male and female hatch by turns, for twelve days. After this period, the young make their appearance; but it is impossible to say with what nourishment their mother supplies them, unless it be with the moisture which they suck from her tongue, while yet humid with the juice of flowers.

There is no possibility of taming birds so tender. No food could be had by human industry, sufficiently delicate to supply the place of the nectar which they gather in their wild state. Some have been kept alive for a few weeks, by syrups; but this nourishment, fine as it may seem, must be gross, when compared with what is commonly gathered by these little flutterers among the flowers. Buffon thinks that honey would have proved a better substitute for their ordinary food.

These little birds are neither shy nor suspicious. They allow themselves to be approached within five or six steps, and thus fall an easy prey to the Indians, who catch them by the artifice of a twig covered with lime, and held out near the flower about which they are fluttering. When taken they instantly expire; and after their death are worn as ear-rings by the young Indian ladies. The Peruvians had at one time the art of composing paintings of their feathers, of very great elegance and lustre. We shall select a specimen or two.

1. T. moschitus. Ruby-necked humming-bird. Green-gold; tail even, ferruginous, the two outer feathers tipt with brown; wings black; bill and legs blackish; crown, hind-head, and neck ruby. Female: beneath whitish-grey, with a gold spot on the breast and throat. Inhabits Guiana, Brasil, and Surinam; rather more than three inches long; according to Marckgraave, the most beautiful of the genus.

2. T. superciliosus. Supercilious humming-bird. Shining-brown; middle tail-feathers long; belly pale flesh-colour; eyebrows white. Inhabits Cayenne; nearly six inches long; one of the largest of the genus; the quill-feathers have a gold gloss on a grey and blackish ground, with a whitish edge at the point; the two shafts white through the whole projecting portions; all the upper side of the back and head gold-colour.

3. T. minimus. Least humming-bird. Green, beneath whitish; lateral tail-feathers white on the outer edge. This is the least of all the tribe, and smaller than several of our bees: in length it is hardly a quarter of an inch: there are several species that do not weigh more than fifty grains; but the general weight of this is from twenty to forty-five grains. The head and whole upper part of the body are of gilded green, with reflections of red, according to the different lights in which they are beheld. All the lower parts are of a whitish grey. The feathers of the wing are of a grey, bordering upon white. The bill and claws black, but covered a considerable way down with small detached hairs, or down. The male is larger than the female, and generally his plumage is of a brighter hue. This small species is found in Brasil, and in some of the West India islands. See Nat. Hist. Pl. CLXXXIV.

TROCHISCUS. (τροχισκος, dim. of τροχος, a wheel.) A troch or round tablet. Troches and lozenges are composed of powders made up with glutinous substances into little cakes, and afterwards dried. This form is principally used for the more commodious exhibition of certain medicines, by fitting them to dissolve slowly in the mouth, so as to pass by degrees into the stomach; and hence these preparations have generally a considerable portion of sugar or other materials grateful to the palate. Some powders have likewise been reduced into troches, with a view to their preparation, though possibly for no very good reasons: for the moistening them and afterwards drying them in the air, must on this account be of greater injury than any advantage accruing from this form can counterbalance.

General rules for making troches.

1. If the mass prove so glutinous as to stick to the fingers in making up, the hands may be anointed with any sweet or aromatic oil; or else sprinkled with powder or starch, or of liquorice, or with flour.

2. In order to thoroughly dry the troches, put them on an inverted sieve, in a shady airy place, and frequently turn them.

3. Troches are to be kept in glass vessels, or in earthen ones well glazed.

The following are the chief preparations under this form.

T. AMYLI. Starch lozenges are used in tickling coughs and acidities of the stomach and bowels.

T. CRETÆ. These are exhibited in cardialgia, acidities of the primæ viæ and diarrhæa.

T. GLYCYRRIZÆ. A pectoral and demulcent lozenge.

T. GLYCYRRIZÆ CUM OPIO. This lozenge possesses pectoral and anodyne qualities, but requires that the quantity be regulated, one grain being contained in a drachm.

T. MAGNESIÆ. Extremely serviceable in pyrosis and flatulent colic.

T. NITRI. An attenuating diaphoretic, calculated to remove viscid phlegm arising from inflammatory angina.

T. SULPHURIS. Aperient and antiscorbutic.

TROCHLEA. (τροχλια, a pulley, from τρεχω, to run.) A kind of cartilaginous pulley, through which the tendon of one of the muscles of the eye passes.

TROCHLEARIS. (*trochlearis musculus.*) See OBLIQUUS SUPERIOR OCULI.

TROCHLEATORES. (*trochleator.*) The fourth pair of nerves are so called, because they are inserted into the musculus trochlearis of the eye. See PATHETICI.

TROCHOID, in the higher geometry, a curve described by a point in any part of the radius of a wheel, during its rotatory and progressive motions. This is the same curve as what is more usually called the cycloid, where the construction and properties of it are shewn.

TROCHOIDES. (from τροχος, a wheel, and ειδος, resemblance.) A species of diarthrosis, or moveable connection of bones, in which one bone rotates upon another; as the first cervical vertebræ upon the odontoid process of the second.

TROCHUS, in zoology, a genus of the

class vermes, order testacea. Animal a limax; shell univalve, spiral, more or less conic; aperture somewhat angular or rounded, the upper side transverse, and contracted; pillar placed obliquely. A hundred and thirty-three species, scattered over the globe; chiefly aquatic, but some terrestrial, and found on sands, or in gardens. They are thus subdivided:

A. Erect, with the pillar perforated.

B. Imperforate erect, the umbilicus, or navel closed.

C. Tapering, with an exserted pillar, and falling on the side when placed upon the base.

TROD. TRODDEN. The participle passive of *tread*.

TRODE. The preterit of *tread*.

TRODE. *s.* (from *trode*, pret. of *tread.*) Footing (*Spenser*).

TROGEN, a town of Swisserland, and the chief place of the protestant part of the canton of Appenzell. It is celebrated for its manufacture of cloth. Near it is a mineral spring containing copper, sulphur, and alum, used externally for several complaints. It is seven miles N. of Appenzell, and seven S.E. of St. Gall.

TROGLODYTES, in the ancient geography, a people of Ethiopia, said to have lived in caves under ground. Pomponius Mela gives a strange account of the Troglodytes: he says, they did not so properly speak as shriek; and that they lived on serpents.

TROGON. Curucui. In zoology, a genus of the class aves, order picæ. Bill shorter than the head, sharp-edged, hooked, the mandibles serrate at the edge; feet formed for climbing. Nine species: they are all natives of warm climates, chiefly of Brasil, and are named curucuis from the similarity of that sound to their voice. Their manners are but little known in Europe. They seem to fill up an intermediate space between the cuckoo and the woodpeckers. Edwards has accordingly described them as a tribe of the former of those genera.

The red-bellied curucui described by Buffon, trogon curucui of Linnéus, is about ten inches and an half in length. The head, neck, and breast of a brilliant green, changing, in different positions, into a lively blue. The wings are of a greyish blue, variegated with small lines of black, in a zig-zag direction.

In St. Domingo, the French call this bird the English lady. Deshayes, the correspondent of the cabinet of curiosities at Versailles, thus describes its manners. It is into the depths of the forest, says he, that the curucui retires, during the seasons of love. Her sad and melancholy accents seem to be the expression of a deep sensibility, which draws her into the desert, to enjoy the solitude, the languor, and tenderness of this passion; feelings seemingly more agreeable to her than its transports. Her notes alone discover her retreat, which is almost always inaccessible, and difficult to track out.

The pairing season commences in the month of April, when these birds search out the hole of a tree for their nest. This mansion they carefully line with dust of worm-eaten wood, which renders it almost as soft as cotton or down. Their strong and sharp bills enable them to enlarge or model the apartment, at pleasure. When the work is completed, the female lays three or four white eggs, nearly of the size of those of the pigeon; and, while employed in incubation, she is not only plentifully supplied in provision by the male; but is carefully watched, and soothed by his song, from a neighbouring branch. This bird, so silent at all other times, makes the woods then echo with blandishing notes; which, insipid to us as they may appear, no doubt soothe the cares of the fond female.

The young, on their first appearance, are perfectly naked; their head and beaks are of a prodigious size, when compared with their body. They are at first fed with small worms and insects, and are no sooner capable of providing their own subsistence, than they abandon themselves to those solitary habits that distinguish their race. They are ten and a half inches long. All the species are solitary, and live in damp unfrequented woods, building on the lower branches: the tail is very long, and consists of twelve feathers.

TROGOSMA, in the entomology of Fabricius, a tribe of the coleopterous genus TENEBRIO; which see.

TROJA. See TROY.

TROJA, a fortified town of Naples, in Capitanata, with a bishop's see immediately under the pope. It is seated at the foot of the Appennines, on the river Chilaro, 32 miles N.E. of Benevento, and 60 N.W. of Naples. Lon. 15. 15 E. Lat. 41. 21 N.

TROIS RIVIERES, a town of Upper Canada, on the river St. Lawrence, 55 miles S.W. of Quebec. Lon. 71. 20 W. Lat. 46. 35 N.

TROKI, a town of Lithuania, capital of a palatinate of the same name. It is seated among morasses, 15 miles W. of Wilna, and 85 N.N.E. of Grodno. Lon. 25. 13 E. Lat. 54. 38 N.

To TROLL. *v. a.* (*trollen*, to roll, Dutch.) To move circularly; to drive about (*B. Jonson*).

To TROLL. *v. n.* 1. To roll; to run round (*Swift*). 2. To fish for a pike with a rod which has a pulley toward the bottom (*Gay*).

TROLLIUS. Globe-ranunculus. Globe-flower. Gowland's locher. In botany, a genus of the class polyandria, order polygynia. Calyxless; petals about fourteen; nectaries about nine, flattened; capsules numerous, oblong, many-seeded. Two species, as follow:

1. T. Europæus. European globe-flower. Corols connivent, nectaries as long as the stamens. A native of Europe, and found wild in our own shades. The stalk is a foot high, and scarcely branched; the flower yellow, globose, and large: it has a pleasant smell, and appears ornamental in gardens.

2. T. Asiaticus. Asiatic globe-flower. Corol spreading; nectaries longer than the stamens, fulvous. A native of Siberia.

TRO'LLOP. *s.* A slatternly loose woman.

TROMBIDIUM, in the entomology of Fabricius, a tribe of the apterous genus HYDRACHNA; which see.

TROMBONE, or TROMBONO. A musical instrument, of which there are three kinds: the bass, the tenor, and the alto. The bass-trombone begins at G gamut, and reaches to C above the bass-cliff note, producing every semitone within that compass. The tenor-trombone begins at A, one note above G gamut, and produces all the semitones up to the fifteenth above; and the alto-trombono begins at C above G gamut, and produces every semitone up to the fifteenth above. This powerfully sonorous instrument is by some esteemed extremely useful in grand chorusses and other full compositions; but many acknowledged judges think it more powerful than musical.

TROMP (Martin Happertz Van), a celebrated Dutch admiral, was born at the Brille, in Holland. He raised himself by his merit, after having distinguished himself on many occasions, especially at the famous engagement near Gibraltar, in 1607. He passed for one of the greatest seamen that had till that time appeared in the world; and was declared admiral of Holland, even by the advice of the prince of Orange. He in that character defeated a large Spanish fleet, in 1630, and gained thirty-two other victories at sea; but was killed, when under deck, in an engagement with the English, in 1653. The states-general caused medals to be struck to his honour, and lamented him as one of the greatest heroes of their republic. Van Tromp, in the midst of the greatest glory, constantly discovered a remarkable modesty; for he never assumed a higher character than that of a burgher, and that of being the father of the sailors.

TRON (St.), a town of Germany, in the bishopric of Liege, with a famous Benedictine abbey, 21 miles W.N.W. of Liege. Lon. 5. 22 E. Lat. 50. 48 N.

TRONAGE, an ancient customary duty or toll, for weighing of wool. According to Fleta, trona is a beam to weigh with, mentioned in the stat. Westm. 2. cap. 25. And tronage was used for the weighing wool in a staple or public mart, by a common trona or beam; which, for the tronage of wool in London, was fixed at Leaden-Hall. The mayor and commonalty of London are ordained keepers of the beams and weights for weighing merchants' commodities, with power to assign clerks and porters, &c. of the great beam and balance; which weighing of goods and wares is called tronage; and no stranger shall buy any goods in London before they are weighed at the king's beam, on pain of forfeiture.

TRONE-WEIGHT, the most ancient of the different weights used in Scotland; and, though now forbidden by several statutes, is still used by many for home-commodities, and that in a very irregular manner; for the pound varies in different places, and for different purposes, from 20 to 24 Dutch ounces. The common allowance is 21½ oz. for wool, 20½ for butter and cheese, 20 for tallow, lint, hemp, and hay. It is divided into 16 of its own ounces, and 16 pounds make a stone.

TROOP. *s.* (*troope*, Dutch.) 1. A company; a number of people collected together (*Shakspeare*). 2. A body of soldiers (*Dry.*). 3. A small body of cavalry.

To TROOP. *v. n.* (from the noun.) 1. To march in a body (*Milton*). 2. To march in haste (*Chapman*). 3. To march in company (*Shakspeare*).

TROOP, a small body of horse or dragoons, about fifty or sixty, sometimes more, sometimes less, commanded by a captain, lieutenant, cornet, quarter-master, and three corporals, who are the lowest officers of a troop.

TRO'OPER. *s.* (from *troop.*) A horse soldier, that fights only on horseback (*Grew*).

TROPÆOLUM. Nasturtium. Indian cress. In botany, a genus of the class octandria, order monogynia. Calyx one-leafed, ending in a spur; petals four, unequal; nuts three, coriaceous. Five species; natives of Peru. The following are cultivated:

1. T. minus. Small Indian cress, or nasturtium.

2. T majus. Great Indian cress, or nasturtium.

The last is by far the larger in all its proportions: though both admit of varieties; especially in regard to the colours of their flowers. The single sorts may be increased by seeds: the double must be propagated by planting cuttings of the branches in the early summer months.

TROPÆOLUM MAJUS. The systematic name of the Indian cress. See NASTURTIUM INDICUM.

TROPE, in rhetoric, a kind of figure of speech, whereby a word is removed from its first and natural signification, and applied with advantage to another thing, which it does not originally mean; but only stands for it, as it has a relation to, or connection with it: as in this sentence, *God is my rock.* Here the trope lies in the word *rock*, which being firm and immoveable, excites in our minds the notion of God's unfailing power, and the steady support which good men receive from their dependence upon him.

TROPEA, a populous town of Naples, in Calabria Ulteriore, with a bishop's see. It was half ruined by an earthquake in 1638, and is seated on the top of a rock, on the E. coast, 10 miles N.W. of Nicotera, and 45 N. by E. of Reggio. Lon. 16. 24 E. Lat. 38. 42 N.

TROPES (St.), a seaport of France, in the department of Var, with a citadel. It is seat- on the bay of Grimauld, in the Mediterranean, 12 miles S.W. of Frejus, and 58 E. of Marseilles. Lon. 6. 44 E. Lat. 43. 16 N.

TRO'PHIED. *a.* (from *trophy.*) Adorned with trophies (*Pope*).

TROPHIS, in botany, a genus of the class monœcia, order tetrandria. Male: calyxless: corol four-petalled. Female: calyxless: corolless: style two-parted: berry once-celled, one-seeded. One species only, a West Indian tree, with nearly erect branches; leaves oblong pointed: male flowers in roundish aments: females racemed: fruit a rough red berry. By some writers this plant is denominated red-fruited bucephalon: by others the ramoom-tree.

TROPHONIUS, a celebrated architect, son of Erginus, king of Orchomenos in Bœotia, built Apollo's temple at Delphi, with the assistance of his brother Agamedes. Having demanded of the god a reward, he was told by the priestess to wait eight days. When the days were passed, Trophonius and his brother were found dead in their bed. According to Pausanias, he was swallowed up alive in the earth, and at Lebadea gave oracles in a cave. Trophonius was honoured as a god; he passed for the son of Apollo, and sacrifices were offered to his divinity, when consulted to give oracles. The cave of Trophonius became one of the most celebrated oracles of Greece. Many ceremonies were required from such as consulted the prophet. Every suppliant was pale and dejected at his return, and thence it became proverbial to say of a melancholy man, that he had consulted the oracle of Trophonius. There were annually exhibited games in honour of Trophonius at Labadea.

TROPHY. (*tropæum.*) Among the ancients, a pile or heap of arms of a vanquished enemy, raised by the conqueror in the most eminent part of the field of battle. The trophies were usually dedicated to some of the gods, especially Jupiter. The name of the deity to whom they were inscribed was generally mentioned, as was that also of the conqueror. The spoils were at first hung upon the trunk of a tree; but instead of trees, succeeding ages erected pillars of stone, or brass, to continue the memory of their victories. To demolish a trophy was looked upon as a kind of sacrilege, because they were all consecrated to some deity. The representation of a trophy is often to be met with on medals of the Roman emperors, struck on occasion of victories; wherein, besides arms and spoils, are frequently seen one or two captives by the sides of the trophy.

TROPICS, in astronomy and geography, are two circles supposed to be drawn on each side of the equinoctial, and parallel thereto. That on the north side of the line is called the tropic of Cancer, and the southern tropic has the name of Capricorn, as passing through the beginning of those signs. These are distant from the equinoctial 23° 27′ 46″, the measure of the obliquity of the ecliptic. Two circles drawn at the same distance from the equator on the terrestrial globe, have the same names in geography, and they include that space or part of the sphere which is called the torrid zone, because the sun is, at one time or other, perpendicular over every part of that zone, and extremely torrifies or heats it.

TROPIC BIRD. See PHAETON.

TRO′PICAL. *a.* (from *trope.*) 1. Rhetorically changed from the original meaning (*So.*). 2. (from *tropic.*) Placed near the tropic; belonging to the tropic (*Salmon*).

TROPICAL SOLAR FLOWERS. Tropici solares flores. Mane aperiūtur, et ante vesperam excluduntur quotidie, sed hora explicationis adscendit vel descendit, uti dies adcrescit aut decrescit; adeoque observant horas turcicas s. inæquales.

Flowers that daily open in the morning, and close before the evening; thus observing in their progress periodical terms, but of a particular kind. See VIGILS.

TROPOLO′GICAL. *a.* (τροπος and λογος.) Varied by tropes; changed from the original import of the words.

TROPO′LOGY. *s.* (τροπος and λογος.) A rhetorical mode of speech including tropes, or a change of some word from the original meaning (*Brown*).

TROPPAU, a strong and considerable town of Germany, in Upper Silesia, capital of a duchy of the same name, with an ancient castle. It was taken by the Prussians in 1741 and 1756, but restored to the house of Austria by a treaty subsequent to each capture. It is seated in a pleasant plain, on the rivers Oppa and Mohra, 40 miles N. by E. of Olmutz, and 72 S. by E. of Breslaw. Lon. 17. 40 E. Lat. 50. 1 N.

TROS, a son of Ericthonius, king of Troy, married Callirhoe, the daughter of the Scamander, by whom he had Ilus, Assaracus, and Ganymedes. He made war against Tantalus, king of Phrygia, whom he accused of having stolen away the youngest of his sons. The capital of Phrygia was called Troja from him, and the country itself Troas.

TRO′SSERS. *s.* (*trousses*, Fr.) Breeches; hose. See TROUSE (*Shakspeare*).

To TROT. *v. n.* (*trotter*, Fr. *trotten*, Dut.) 1. To move with a high jolting pace (*Shaks.*). 2. To walk fast: in a ludicrous or contemptuous sense.

TROT. *s.* (*trot*, French.) 1. The jolting high pace of a horse (*Dryden*). 2. An old woman in contempt (*Shakspeare*).

TROTH. *s.* (*trouth*, old Eng. ᵹꞃeoð, Sax.) 1. Belief; faith; fidelity (*Shakspeare*). 2. Truth; verity (*Addison*).

TRO′THLESS. *a.* (from *troth.*) Faithless; treacherous (*Fairfax*).

TRO′THPLIGHT. *a.* (*troth* and *plight.*) Betrothed; affianced (*Shakspeare*).

TRO′TTER. *s.* (from *trot.*) 1. One that walks a jolting pace. 2. A sheep's foot.

To TRO′UBLE. *v. a.* (*troubler*, French.) 1. To disturb; to perplex (*Locke*). 2. To afflict; to grieve (*Tillotson*). 3. To distress; to make uneasy (*Milton*). 4. To busy; to engage overmuch (*Luke*). 5. To give occasion of labour to. A word of civility or slight regard (*Locke*). 6. To tease; to vex (*Shakspeare*). 7. To disorder; to put into agitation or commotion (*Davies*). 8. (In low language.) To sue for a debt.

TRO′UBLE. *s.* (*trouble*, French.) 1. Disturbance; perplexity (*Milton*). 2. Affliction; calamity (*Shakspeare*). 3. Molestation; obstruction; inconvenience (*Milton*). 4. Uneasiness; vexation (*Milton*).

TRO′UBLE-STATE. *s.* (*trouble* and *state.*) Disturber of a community; public makebate (*Daniel*).

TRO′UBLER. *s.* (from *trouble.*) Disturber; confounder (*Atterbury*).

TRO′UBLESOME. *a.* (from *trouble.*) 1. Vexatious; uneasy; afflictive (*Tillotson*). 2. Full of molestation (*Atterbury*). 3. Burdensome; tiresome; wearisome (*Pope*). 4. Full of teasing business (*Sidney*). 5. Slightly harassing (*Shakspeare*). 6. Unseasonably engaging; improperly importuning (*Spenser*). 7. Importunate; teasing (*Arbuthnot*).

TRO′UBLESOMELY. *ad.* (from *troublesome.*) Vexatiously; wearisomely; unseasonably; importunately (*Locke*).

TRO′UBLESOMENESS. *s.* (from *troublesome.*) 1. Vexatiousness; uneasiness (*Bacon*). 2. Importunity; unseasonableness.

TRO′UBLOUS. *a.* (from *trouble.*) Tumultuous; confused; disordered; put into commotion (*Spenser*).

TRO′VER. *s.* (*trouver*, Fr.) In the common law, is an action which a man hath against one that having found any of his goods refuseth to deliver them (*Cowell*).

TROUGH. *s.* (ꞇꞃoᵹ, ꞇꞃoh, Saxon; *troch*, Dutch.) Any thing hollowed and open longitudinally on the upper side (*Dryden*).

TROUGH (Pneumatic). In all the common operations of receiving and transferring gasses, they are held in jars or other vessels previously filled with water and inverted over this fluid. It is therefore necessary to have some kind of water vessel large and deep enough entirely to immerse the air-jar, that every particle of common air may be displaced by the water before it receives the gass to be operated on. Dr. Priestley's first water-trough for this purpose was a common oval or round tub, but as a jar full of air standing inverted over water, and immersed in it for any depth, would be readily overset by the pressure of the water, this ingenious philosopher adapted a small hanging shelf, suspended from the sides of the tub, and sinking below the level of the water, only just sufficient to confine the gass in any jar standing upon it; and this is the basis of the plans which have since been adopted, and which in reality consist of the same with a few variable improvements.

In gasses absorbable by water the trough must be filled not with water but with mercury. They may be made of close hard wood, as mahogany; or cut out of a block of ordinary marble or freestone; or as is now more common, they may consist of a thin iron case inclosed in wood of any kind.—They must be made very solid to bear the great weight of metal that is required even for a very moderate-sized vessel, and for the same reason, and to save the great expence of the metal, they are always made much smaller than the water-troughs. This will not appear an indifferent object when it is considered that half a hundred weight of this metal will not occupy a space greater than about two quarts, which is but a very scanty allowance of room for a trough for chemical purposes.

In order still more to economize room, and consequently mercury, only one side of the trough is sunk deep, being equally convenient for the immersion of a jar. The shelf in a trough of this construction is on each side of the well. It is useful also to have an iron stem supporting a semicircular clip, screwed or otherwise fastened into the substance of the trough a little beyond the deep circular part of the well, to support a jar when inverted and heavy with mercury. A small glass tube open at both ends, and drawn out capillary at one extremity, is a useful addition to this apparatus, to enable the operator to suck up and collect the small globules of mercury which will always be scattered about during these experiments.

To TROUL. *v. n.* (*trollen*, to roll, Dutch.) See TROLL. 1. To move volubly (*Milton*). 2. To utter volubly (*Shakspeare*).

To TROUNCE. *v. a.* To punish by an indictment or information (*Dryden*).

TROUSE. TRO′USERS. *s.* (*troussé*, French; *truish*, Erse.) Breeches; hose (*Wiseman*).

TROUT, in ichthyology. See SALMO.

This is a delicious fresh-water fish, observed to come in and go out of season with the stag and buck, and spawns about October and November, which is the more admirable, because most other fish spawn in warm weather, when the sun by its heat has cherished the earth and water, making them fit for generation. There are several sorts of this fish highly valuable; such as the fordage-trout, the armerly trout, the bull-trout, in Northumberland, &c.; but it is observable, that the red and yellow trouts are the best; and as to their sex, the female has the preference, having a less head and deeper body than the male; by their large back you may know that they are in season, with the like note for all other fish. The trout is of a more sudden growth than other fish: he lives not so long as the perch and divers other fishes do, as sir Francis Bacon hath observed in his history of life and death.

They are all the winter sick, lean, and unwholesome, and often found to be lousy: these trout lice are small worms, with big heads, sticking close to the fish's sides, and sucking moisture from him that gave them being; neither is he freed from them till the spring, or beginning of summer, at which time his strength increases; then he deserts the deep still waters, and betakes himself to gravelly ground, against which he ceases not to rub himself till he is cleansed from that lousiness: from that instant he delights to be in sharp streams, and such as are swift, where he will lie in wait for minnows and May flies; at the latter end of which month he is in his prime, being fattest and best.

Trouts are usually caught with a worm, minnow, or fly, either natural or artificial, There are several sorts of worms which are baits proper for the angler; as the earth-worm, dung-worm, the maggot or gentle; but for the trout, the lob-worm and brandling are accounted the best, or squirrel-tail, having a red head, streaked down the back, and a broad tail.

To avoid confusion, it may be necessary to remark, that the same kind of worm is, in different places, known by different names: thus the marsh and the meadow-worm are the same; and the lob-worm, or twachel, is also called the dew-worm and the garden-worm; and the dock-worm is, in some places, called the flag-worm.

The tag-tail is found in March and April, in marled lands or meadows, after a shower of rain, or in a morning, when the weather is calm, and not cold.

To find the oak-worm, beat on an oak-tree, that grows over a highway or bare place, and they will fall for you to gather.

To find the dock-worm, go to an old pond or pit, and pull up some of the flags; shake the roots in the water, and amongst the fibres that grow from the roots you will perceive little husks, or cases, of a reddish or yellowish colour; open these carefully with a pin, and take from thence a little worm, pale and yellow, or white, like a gentle, but longer and slenderer, with rows of feet down his belly, and a red head: this is the dock or flag worm. An excellent bait for grayling, tench, bream, carp, roach and dace.

Of the winds the south is said to be best: next to this the west wind. The fish lies or swims nearer the bottom, and in deeper water, in winter than in summer; and also nearer the bottom in any cold day, and then gets nearest the lee-side of the water.

Fish for him with a long line, and not a little hook, and let him have time to gorge your hook, for he does not usually forsake it, as he oft will in the day-fishing: and if the night be not dark, fish with an artificial fly of a light colour, and at the snap: he will sometimes rise at a dead mouse, or a piece of cloth, or any thing that seems to swim across the water, or to be in motion.

The trout delights in small purling rivers and brooks, with gravelly bottoms and a swift stream; his haunts are an eddy, behind a stone, a log, or a bank that projects forward into the river, and against which the stream drives; a shallow between two streams, or, towards the latter end of the summer, a mill tail. His hold is usually in the deep, under the hollow of a bank, or the root of a tree. There are no trout superior in quality, size, and colour, to those caught in the Isis above Oxford; but they are so scarce, that though they are of advantage to the proprietor of the water, they are hardly worth the attention of the angler.

The trout spawns about the beginning of November, and does not recover till the beginning of March.

Walton has been so particular on the subject of trout fishing, that he has left very little room to say any thing by way of annotation with respect to baits, or the method of taking this fish; yet there are some directions and observations pertinent to this subject, which we are persuaded several of our readers will be glad to possess.

When you fish for large trout or salmon, a winch will be very useful: upon the rod with which you use the winch, whip a number of small rings of about an eighth of an inch diameter, and at first about two feet distant from each other; but afterwards diminishing gradually in their distances, till you come to the end: the winch must be screwed on to the butt of your rod, and round the barrel let there be wound eight or ten yards of wove hair or silk line: when you have struck a fish that may endanger your tackle, let the line run, and wind him up as he tires.

You will find great convenience in a spike made of a piece of the greater end of a sword-blade, screwed into the hither end of the butt of your rod; when you have struck a fish, retire from the river, and, by means of the spike, stick the rod perpendicularly in the ground; you may then hold on the line, and draw the fish to you, as you see proper.

When you angle for a trout, whether with a fly or at the ground, you need make but three or four trials in a place; which, if unsuccessful, you may conclude there are none there.

In the night the best trouts come out of their holes; and the manner of taking them is on the top of the water with a great lob or garden-worm, or rather two, which you are to fish with in a place where the waters run somewhat quietly, for in a stream the bait will not be so well discerned. In a quiet or dead place near some swift, there draw your bait over the top of the water to and fro, and if there be a good trout in the hole, he will take it, especially if the night be dark: for then he is bold, and lies near the top of the water, watching the motion of any frog or water-rat, or mouse, that swims betwixt him and the sky; these he hunts after, if he see the water but wrinkle, or move in one of these dead holes, where these great old trouts usually lie, near their holds; for the great old trout is both subtil and fearful, and lies close all day, and does not usually stir out. His chief feeding is seldom in the day, but usually in the night, and then he feeds very boldly.

He that angles with ground-bait must fit his tackle to his rod, and begin at the upper end of the stream, carrying his line with an upright hand, feeling his plummet running on the ground some ten inches from the hook, plumbing his line according to the swiftness of the stream that he angles in; for one plummet will not serve for all streams.

The minnow (or as some call it, the penk) is a singular bait for a trout, for he will come as boldly at it as a mastiff dog at a bear. It will be advantageous to the angler to use a line of three silks and three hairs twisted for the uppermost part of the line, and two silks and two hairs twisted for the bottom, next the hook, with a swivel nigh the middle of his line, and a pretty large hook.

The minnow is not easily found and caught till March, or in April, for then he appears first in the river, nature having taught him to shelter and hide himself in the winter in the ditches that are near the river, and there to keep himself warm in the mud or in the weeds, which rot not so soon as in a running river: in which place if he were in winter, the distempered floods that are usually in that season, would suffer him to take no rest, but carry him headlong to mills and weirs to his confusion. And of these minnows, the biggest size is not the best; but the middle size and the whitest: your minnow must be so put on your hook, that it must turn round when it is drawn against the stream; and that it may turn nimbly, you must put it on a big-sized hook, thus: put your hook in at his mouth and out of his gill, then having drawn your hook two or three inches beyond or through his gill, put it again into his mouth, and the point and beard out at his tail, and then tie the hook and his tail about very neatly with a white thread, which will make it the apter to turn quick in the water: this done, pull back that part of your line which was slack when you put your hook into the minnow a second time; so that it may fasten the head, and the body of the minnow will be almost straight on your hook; this done, try how it will turn by drawing it across the water, or against a stream, and if it do not turn nimbly, turn the tail a little to the right or left hand, and try it again till it turn it quick; for if not, you are in danger of not catching any thing; it is impossible that it should turn too quick; and in case you want a minnow, a small loach or a stickleback, or any other small fish that will turn quick, will serve as well.

The angler must angle with the point of his rod down the stream, drawing the minnow up the stream by little and little, near the top of the water: the trout seeing the bait, will come more fiercely at it; but the angler must not immediately strike; this is a true way without lead, for many times they will forsake the lead and come to the minnow.

In angling with a fly for a trout, the rod should be of pliant hazel in one or two pieces: the lower part of the line should be of three or four-haired links; yet he who can fish well with a single hair will have a great advantage. The young angler should learn to cast his line dexterously, and let the fly first fall on the water; for if any other part descend, he will drive the trout away. He must always cast down the stream with the wind behind, and the sun or moon before him.

To TROW. *v. n.* (ꞇꞃeoðian, Saxon; *troe*, Danish.) 1. To think; to imagine; to conceive: not used (*Sidney*). 2. To believe (*Shakspeare*).

Trow. *interject.* An exclamation of inquiry (*Shakspeare*).

TROWBRIDGE, a town in Wiltshire, with a market on Saturday. The inhabitants are principally clothiers, who make superfine broad cloth and kerseymere, in a great degree by machinery. It is seated on a hill, 23 miles S.W. of Marlborough, and 98 W. of London. Lon. 2. 6 W. Lat. 51. 19 N.

TRO'WEL. *s.* (*truelle*, Fr. *trulla*, Latin.) A tool to take up the mortar with, and spread it on the bricks (*Moxon*).

TROX, in the entomology of Fabricius, a tribe of the genus Scarabæus, which see.

TROY, Troja, a city, the capital of Troas, or, according to others, a country of which Ilium was the capital, built near mount Ida, and the promontory of Sigæum, at the distance of about four miles from the sea. Dardanus, the first king of the country, built it, and called it Dardania, and from Tros, one of his successors, it was called Troja, and from Ilus Ilion. This city has been celebrated by the poems of Homer and Virgil; and of all the wars which have been carried on among the ancients, that of Troy is the most famous, which was undertaken by the Greeks, to recover Helen, whom Paris, the son of Priam, king of Troy, had carried away from the house of Menelaus. All Greece united to avenge the cause of Menelaus, and every prince furnished a certain number of ships and soldiers. According to the most generally received computation, no less than 100,000 men were engaged in this celebrated expedition. Agamemnon was chosen general of all these forces, after the war had been protracted, and the siege of Troy carried on for the space of ten years. Some of the Trojans, among whom were Æneas and Antenor, betrayed the city into the hands of the enemy, and Troy was reduced to ashes. The poets, however, support, that the Greeks made themselves masters of the place by secretly filling a large wooden horse with armed men, which by artifice they introduced within the walls of the besieged city. These troops confined within the sides of the animal rushed out by night, and opened the gates to their companions. The greatest part of the inhabitants were put to the sword, and the others carried away by the conquerors. This happened, according to the Arundelian marbles, about 1184 years before the Christian era, in the 3530th year of the Julian period, on the night between the 11th and 12th of June, 408 years before the first Olympiad.

It has, of late, been questioned whether Troy ever had a real existence. But surely, if any one can be fully persuaded that Homer's account has no foundation in truth, he may easily become a convert to the system of Berkeley, and consider the visible works of the creation as the dreams and phantoms of his own imagination.

In Dr. Chandler's History of Ilium, this question is amply investigated: the following interesting quotation from that work will show the evidence and credibility of the genuine story.

"The Greeks were solicitous to render the memory of an achievement, which continued for many centuries the most remarkable of any in their history, perpetual. They represented the various incidents on their public monuments and edifices in marble, on their gems, and drinking cups. It was the favourite subject of their poets, painters, and sculptors. Several of their ancient temples were rich in spoils of Troy; and some exhibited, for ages, tools, which had been employed in the siege; weapons, and armour of the warriors, which had been suspended as votive offerings on the walls or deposited in their treasuries; and the real or pretended relics of some of the chieftains, who had been present, were prized like those of modern saints; far distant cities making a boast of having them in their possession.

"The Ilias was generally received, both in Europe and Asia, as an indisputable record. Its testimony was confirmed by the annals and traditions of all the nations engaged in the war on either side; which jointly and separately demonstrated its main narrative not to be fiction or romance. Moreover, the posterities of several of the kings and princes mentioned by Homer remained, and were acknowledged as such for many successive generations. Another Ilium arose in the Troja, to preserve the name and memory of that which had been destroyed. The port principally used by the ships under Agamemnon continued, after their departure, to be called that of The Achæans; and the stations of the vessels of Achilles and Ajax Telamon were pointed out for ages: besides barrows, ruined cities, and other remaining evidences of the transaction. The knowledge of the principal events of the war and of its consequences would have been propagated and transmitted down both in Asia and Europe, though not to the same extent or with equal celebrity, if the Ilias and Odyssey had never been composed.

"Many Greeks and Trojans perished, fighting in the plain, in storming or defending the outwork of the camp or the city-wall. It was the usage of each people to consume the bodies with fire; but, while one heap of wood sufficed for the vulgar dead, and one pit received their ashes, a separate funeral, solemn and expensive ceremonies, a vast pile blazing across the Hellespont, and a barrow with a stela or stone-pillar on it, distinguished the fallen chief.

"The Greeks celebrated the obsequies of their slain, after the establishment of their camp, apart from it; those of the leaders generally near their quarters or on the shore of the Hellespont. There, Nestor tells Telemachus in the Odyssey, lay Patroclus and Achilles, Ajax Telamon, and his own son Antilochus. There also lay other renowned warriors, whose monuments, though we find little or no notice taken of them in remaining authors, may have continued extant, and been distinguished in after ages by antiquaries and the people of the country.

"The rites of the dead, as established by ancient usage, inspired a reverence for places of sepulture, and prevented the memory of their owners, whose names were frequently inscribed on the pillars fixed in the ground over them, from falling suddenly into oblivion. Libations of milk, wine, honey, and the like, were poured on the sod or surface of the barrows; and other offerings were made, supposed to be grateful to the ghosts; which were believed to reside beneath, and to visit the altars placed near them. The heroes accounted demigods had temples, at which victims were slain before their idols. We shall find several of the barrows denominated long after from the warriors whose relics they covered; and giving names to settlements made near them, and maintained in good measure by the resort of people attending the anniversaries and festivals held at them, or casually visiting them from curiosity or from devotion. That of Achilles and Patroclus was called from the former, as the more excellent and illustrious of the two, Achilleion; that of Ajax, Æantion; and so on with others. Those of Protesilaus, Hector, and Memnon the rival of Achilles in posthumous fame and fable, were planted with trees to protect them from cattle and from the sun.

"The divine honours of Achilles were said to have commenced, before the departure of the Greeks from the Hellespont, with the horrid sacrifice of Polyxena, a captive daughter of Priam. Pyrrhus, in the sequel of the Ilias, declares, that he had seen his father in a vision, and that he required this offering. He is described as holding the victim with his left hand, placing his right on the barrow, and praying to Achilles, that the storm raised by him, to detain them until his manes should be gratified, might cease. Pyrrhus afterwards settled a colony in Epirus, where a dynasty or series of kings were named from him Pyrrhidæ, and where Achilles was worshipped under the title of Aspetos, The Inimitable.

"The homage paid to Achilles and Patroclus, to Hector, to Ajax Telamon, Antilochus and Protesilaus, at their barrows, by the circumjacent people of the Troia and Chersonesus, was, at what time soever it began, of long duration; and, as will appear in the sequel, transmitted down from age to age, until it was finally extinguished by the establishment of Christianity in the Roman empire. A native or a traveller in these countries, before that period, seeing the barrows remaining, and still objects as well of public as private regard, would not have believed it possible that the time would come when the former existence of Troy and of the heroes would be called in question.

"Many additions were made in after ages to the Trojan story. Some were the inventions or embellishments of the poets, especially the tragic; some of artists, who employed their pencil or chisel on select portions of it; some were grafted on passages of the Ilias; and more were not countenanced or supported by, but irreconcilable with, Homer.

"The legendary tales current, as well among the European as Asiatic Greeks, concerning the heroes, and, in particular, Achilles, to whom I shall confine myself, were almost innumerable. I dwell not on such fables as the immersion of her infant son by Thetis in the river Styx, and his consequent invulnerability except in the heel; his education, not according to the Ilias, under Phœnix, but Chiron, who is there only said to have given him some instructions in the art of surgery; his concealment among women and the detection of him by Ulysses, contrary to Homer; his intended marriage with Polyxena, daughter of Priam; the meeting for its adjustment or celebration in the temple of Apollo at Thymbra; and his being treacherously slain there by Paris. Some of these are interpolations utterly undeserving of notice, had they not been occasionally adopted by writers; and in particular by M. Chevalier, in preference to the genuine story as delivered in Homer.

“ Achilles, Antilochus, and Ajax Telamon, are represented in two episodes of the Odyssey, as companions in the Asphodel-meadow, the dwelling-place of the shades of defunct heroes, in the kingdom of Pluto. Agamemnon, who in the first of them, which was regarded as an interpolation by Aristarchus, addresses Achilles, might have added other topics of congratulation, had they been known to the author; such as the admission reserved for him among the Immortals, his marriage with Medea (which is said to have been a fiction of the very ancient poet Ibycus, who was followed in it by Simonides), and his having a sacred island, of which tale the origin is given by Pausanias on the joint testimony of the people of Crotona in Italy and of Himera in Sicily.

“ The people of Crotona, says the relator, waging war with the Locri of Italy, their general, in an attack on the front line of the enemy, where he was told their patron-hero, Ajax Oïleus (his image, I apprehend,) was posted, received a wound in the breast. The Delphic oracle directed him to repair to Leuce, an island in the Euxine sea, to be cured by Ajax. On his return, he declared that he had seen Achilles, who resided there with Helen, Patroclus, Antilochus, and the two Ajaxes; and a message from Helen, which he delivered to the poet Stesichorus of Himera, by whom some reflections had been cast on her, probably in his Destruction of Troy, was, they said, the occasion of his writing a palinode or recantation.

“ This island of Achilles, which is mentioned by Euripides and by many other ancient authors, was formed by mud from rivers; and perhaps has since been connected with the continent of Europe. But, whatever it may now be, for the spot has not been explored, it was originally small, and is described as desert and woody, as abounding in living creatures, and much frequented by aquatic birds, which were regarded as the ministers of the hero, fanning his grove with their wings, and refreshing the ground with drops, as it were of rain, from their bodies. He was said to be visited there by Protesilaus, and several of his friends, who had been likewise released from the regions of Pluto; to appear sometimes; and oftener to be heard, playing on his lyre, and accompanying it with a voice divinely clear. A long and narrow peninsula in the same sea was called The Course of Achilles; being the place where he was reputed to take his exercise of running.

“ It does not often happen that ancient fiction can, as in this instance, be traced to its source; and scepticism or incredulity is frequently the result of difficulty in discriminating true history from its alloy. Mr. Bryant has contended, that the two poems of Homer are mere fables, and that no such war, no such place as Troy, has ever existed. Having made a large collection of idle and absurd stories from different authors about Jupiter and Leda, and Helen (whom he will not allow to have been carried away from Sparta by Paris), and several other persons concerned, he declares, and nobody, I imagine, will dissent from a position of so great latitude, that ‘The account of the Trojan war, as delivered by Homer and other Grecian writers, is attended with so many instances of inconsistency and so many contradictions, that it is an insult to reason to afford it any credit.’

“ In the description, says the same learned person, of the siege of Troy and the great events with which it was accompanied, Homer ‘ is very particular and precise. The situation of the city is pointed out as well as the camp of the Grecians,’ and various objects, ‘ with the course and fords of the river, are distinctly marked, so that the very landscape presents itself to the eye of the reader.—The poet also’ mentions ‘ several’ subsequent ‘ events—in medias res non secus ac notas auditorem rapit—’ all which ‘ casual references seem to have been portions of a traditional history well known in the time of Homer, but as they are introduced almost undesignedly, they are generally attended with a great semblance of truth. For such incidental and partial intimations are seldom to be found in romance and fable.’ Who, on reading these remarks, would suspect it to be the scope of the author to prove the whole story of Troy as ideal as a fairy-tale?

“ I will not enter here on a particular examination of the arguments used by Mr. Bryant on this occasion. Some of them I shall be obliged, though unwilling, to notice as we proceed. It may, however, be now mentioned, that among other novel opinions, for which I refer to his Dissertation, he maintains, that the ground-work of the Ilias, if it had any, was foreign to the country on which we are employed; that the history never related, but has been borrowed and transferred, to it; that in short, the original poem of Troy, the parent of the Ilias, was an Egyptian composition. I shall add a companion or two to this notable discovery. A disciple of Epicurus undertook to prove the Ilias to be entirely an allegory; and I have somewhere read, that it was not first written in Greek, but is a translation from the Celtic language.

"I subjoin the very different opinion of a respectable writer in the Ancient Universal History on the same subject. 'The name of king Priam will ever be memorable on account of the war which happened in his reign; a war famous to this day for the many princes of great prowess and renown concerned in it, the battles fought, the length of the siege, the destruction of the city, and the endless colonies planted in divers parts of the world by the conquered as well as the conquerors.' 'Truly, (says my author), the siege and taking of Troy are transactions so well attested, and have left so remarkable an epocha in history, that no man of sense can call them in question.'"

TROY-WEIGHT, anciently called Trone weight, is supposed to be taken from a weight of the same name in France, and that from the name of the town of Troyes there.

The original of all weights used in England was a corn or grain of wheat gathered out of the middle of the ear, and, when well dried, 32 of them were to make one pennyweight, 20 pennyweights 1 ounce, and 12 ounces 1 pound Troy. See Statutes of 51 Hen. III. 31 Edw. I. and 12 Hen. VII.

But afterward it was thought sufficient to divide the said pennyweight into 24 equal parts, called grains, being the least weight now in common use. See WEIGHTS.

TROYES, a considerable city of France, in the department of Aube, with a bishop's see. It is surrounded by good walls, but almost all the houses are of wood, and good water is wanting. Among the objects of curiosity are St. Stephen's, the principal church; the public library of the late Cordeliers; and the castle in which the ancient counts of Champagne resided. Its commerce, once very flourishing, now consists only in some linens, dimities, fustians, wax-chandlery, candles, and wine. It is seated on the Seine, 30 miles E.N.E. of Sens, and 90 E.S.E. of Paris. Lon. 4. 10 E. Lat. 48. 13 N.

TRU'ANT. *s.* (*truand*, old French; *treuwant*, Dut.) An idler; one who wanders idly about, neglecting his duty or employment. To play the *truant* is, in schools, to stay from school without leave (*More*).

TRU'ANT. *a.* Idle; wandering from business; lazy; loitering (*Shakspeare*).

To TRU'ANT. *v. n.* (*truander*, Fr. *truwanten*, old German.) To idle at a distance from duty; to loiter; to be lazy (*Shakspeare*).

TRU'ANTSHIP. *s.* (from *truant.*) Idleness; negligence; neglect of study or business (*Ascham*).

TRU'BTAIL. *s.* A short squat woman (*Ainsworth*).

TRUCE. *s.* (*truga*, low Lat. *truie*, old Fr.) 1. A temporary peace; a cessation of hostilities (*Dryden*). 2. Cessation; intermission; short quiet (*Milton*).

TRUCIDA'TION. *s.* (from *trucido*, Lat.) The act of killing.

To TRUCK. *v. n.* (*troquer*, Fr. *truccare*, Italian.) To traffic by exchange; to give one commodity for another.

To TRUCK. *v. a.* To give in exchange; to exchange (*Swift*).

TRUCK. *s.* (from the verb.) 1. Exchange; traffic by exchange (*Dryden*). 2. (τροχος.) Wooden wheels for carriage of cannon (*Ainsworth*).

To TRU'CKLE. *v. n.* To be in a state of subjection or inferiority; to yield; to creep (*Cleaveland*).

TRU'CKLEBED, or TRUNDLEBED. *s.* (properly *troclebed*; from *troclea*, Latin, or τροχος.) A bed that runs on wheels under a higher bed (*Shakspeare*).

TRU'CULENCE. *s.* (*truculentia*, Latin.) 1. Savageness of manners. 2. Terribleness of aspect.

TRU'CULENT. *a.* (*truculentus*, Latin.) 1. Savage; barbarous (*Ray*). 2. Terrible of aspect. 3. Destructive; cruel (*Harvey*).

To TRUDGE. *v. n.* (*truggiolare*, Italian.) To travel laboriously; to jog on; to march heavily on (*Locke*).

TRUE. *a.* (ꞇꞃeoƿa, ꞇꞃuƿa, Saxon.) 1. Not false; not erroneous; agreeing with fact, or with the nature of things (*Cowley*). 2. Not false; agreeing with our own thoughts. 3. Pure from the crime of falsehood; veracious (*Proverbs*). 4. Genuine; real; not counterfeit (*Milton*). 5. Faithful; not perfidious; steady (*Pope*). 6. Honest; not fraudulent (*Shakspeare*). 7. Exact; conformable to a rule (*Prior*). 8. Rightful (*Milton*).

TRUEBO'RN. *a.* (*true* and *born.*) Having a right by birth to any title (*Shakspeare*).

TRUEBRE'D. *a.* (*true* and *bred.*) Of a right breed (*Dryden*).

TRUEHE'ARTED. *a.* (*true* and *heart.*) Honest; faithful (*Shakspeare*).

TRU'ELOVE. See PARIS.

TRUELO'VEKNOT. TRUELO'VERSKNOT. *s.* (*true*, *love*, and *knot.*) Lines drawn through each other with many involutions, considered as the emblem of interwoven affection (*Hudibras*).

TRU'ENESS. *s.* (from *true.*) Sincerity; faithfulness (*Bacon*).

TRUEPE'NNY. *s.* (*true* and *penny.*) A familiar phrase for an honest fellow (*Shakspeare*).

TRUFFLE, in botany, the lycoperdon tuber of Linnéus; but deserving, on account of its considerable difference from the proper lycoperdon, a distinct generic classification; for which, see TUBER. It is a solid fungus of a globular figure, which grows under the surface of the ground, so as to be totally hidden. It has a rough blackish coat, and is destitute of fibres. Cooks are well acquainted with its use and qualities. It is found in woods and pastures in some parts of Kent, but is not very common in England. In France and Spain truffles are very frequent, and grow to a much larger size than they do here. In these places the peasants find it worth their while to search for them, and they train up dogs and swine for this purpose, who after they have been inured to their smell by their masters frequently placing them in their way, will readily scrape them up as they ramble the fields and woods.

TRUG. *s.* A hod for mortar.

TRUGILLO, a town of Terra Firma, in Venezuela, 120 miles S. of the lake Maracaybo. Lon. 7. 40 W. Lat. 9. 46 N.

TRULL. *s.* (*trulla*, Ital.) 1. A low whore; a vagrant strumpet (*Shakspeare*). 2. A girl; a lass; a wench (*Tuberville*).

TRU'LY. *a.* (from *true.*) 1. According to truth; not falsely; faithfully; honestly (*Sidney*). 2. Really; without fallacy (*Milton*). 3. Exactly; justly (*South*). 4. Indeed (*Wotton*).

TRUMP. *s.* (*trompe*, Dutch, and old Fr. *tromba*, Italian.) 1. A trumpet; an instrument of warlike music (*Wesley*). 2. (corrupted from *triumph.*) A winning card; a card that has particular privileges in a game (*Sw.*). 3. *To put to* or *upon the* TRUMPS. To put to the last expedient (*Dryden*).

To TRUMP. *v. a.* (from the noun.) 1. To win with a trump card. 2. *To* TRUMP *up.* (from *tromper*, Fr. to cheat.) To devise; to forge.

TRU'MPERY. *s.* (*tromperie*, Fr. a cheat.) 1. Something fallaciously splendid; something of less value than it seems (*Shakspeare*). 2. Falsehood; empty talk (*Raleigh*). 3. Something of no value; trifles (*Milton*).

TRUMPET. The loudest of all portable wind-instruments, and consisting of a folded tube generally made of brass, and sometimes of silver.

The ancients had various instruments of the trumpet kind, as the tuba, cornua, &c. Moses, as the scripture informs us, made two of silver to be used by the priests: and Solomon, Josephus tells us, made two hundred like those of Moses, and for the same purpose.

The modern trumpet consists of a mouthpiece, near an inch across. The pieces which conduct the wind are called the branches; the parts in which it is bent, the potences; and the canal between the second bend and the extremity, the pavilion: the rings where the branches take asunder, or are soldered together, the knots; which are five in number, and serve to cover the joints.

One particular in this powerful and noble instrument is, that, like the horn, it only commands certain notes within its compass.

The trumpet produces, as natural and easy sounds, G above the bass-cliff note, or fiddle G, C on the first ledger line below in the treble, E on the first line of the stave, G on the second line, C on the third space, and all the succeeding notes up to C in alt, including the sharp of F, the fourth of the key.

Solo performers can also produce B flat (the third above the treble-cliff note): and by the aid of a newly invented slide many other notes which the common trumpet cannot sound are now produced.

TRUMPET (Hearing). See EAR-TRUMPET.

TRUMPET MARINE, or MARIGNY, is a stringed instrument, invented in the 16th century by an Italian artist Marino or Marigni, and called a trumpet, because it takes only the notes of the trumpet, with all its omissions and imperfections, and can therefore execute only such melodies as are fitted for that instrument. It is a very curious instrument, though of small musical powers, because its mode of performance is totally unlike that of other stringed instruments. It is a kind of monochord, consisting of three tables, which form its triangular body. It has a very narrow neck, with one thick string, mounted on a bridge, which is firm on one side, and tremulous on the other. It is struck with a bow by the right hand, while the thumb of the left is pressed on the string. The peculiarity of its sound, which resembles that of the trumpet, is produced by the tremulation of the bridge.

TRUMPET (Speaking), is a tube of considerable length, viz. from 6 feet to 12, and even more, used for speaking with to make the voice heard to a greater distance. In a trumpet of this kind the sound in one direction is supposed to be increased, not so much by its being prevented from spreading all round, as by the reflection from the sides of the trumpet. The figure best suited for the speaking trumpet is that which is generated by the rotation of a logarithmic curve, about a line parallel to the axis. The trumpet used at sea is an hollow instrument of copper, or of tinned iron plates. It is open at both ends, and the narrow end A is shaped so as to go round the speaker's mouth, and to leave the lips at liberty within it. The edge of this narrow end A is generally covered with leather or cloth, in order that it may more effectually prevent the passage of any air between the trumpet and the face of the speaker. The words which are spoken through a speaking trumpet may be heard much further and louder, but not so distinctly, as without the trumpet. A speaking trumpet has been applied to the mouth of a gun or pistol, by which means the explosion has been rendered audible at a vast distance. Such contrivances it has been thought might be used as signals in certain cases.

TRUMPET FLOWER, in botany. See BIGNONIA.

TRUMPET HONEYSUCKLE, in botany. See LONICERA.

To TRU'MPET. *v. n.* (*trompetter*, French.) To publish by sound of trumpet; to proclaim (*Bacon*).

TRU'MPETER. *s.* (from *trumpet.*) 1. One who sounds a trumpet (*Hayward*). 2. One who proclaims, publishes, or denounces (*Sou.*).

TRUMPETER, in ornithology. See PSOPHIA.

TRU'MPET-TONGUED. *a.* (*trumpet* and *tongue.*) Having tongues vociferous as a trumpet (*Shakspeare*).

TRUMPINGTON, a village in Cambridgeshire, two miles from Cambridge, where several Roman antiquities have been found; and where, till very lately, were the ruins of the mill, commemorated by Chaucer, in The Miller's Tale.

TRU′MPLIKE. *a.* Resembling a trumpet (*Chapman*).

To TRU′NCATE. *v. a.* (*trunco*, Lat.) To maim; to lop; to cut short.

TRUNCA′TION. *s.* (from *truncate.*) The act of lopping or maiming.

TRU′NCHEON. *s.* (*trunçon*, French.) 1. A short staff; a club; a cudgel (*Hayward*). 2. A staff of command (*Shakspeare*).

To TRU′NCHEON. *v. a.* (from the noun.) To beat with a truncheon (*Shakspeare*).

TRUNCHEONE′ER. *s.* (from *truncheon.*) One armed with a truncheon (*Shakspeare*).

To TRU′NDLE. *v. n.* (ꞇꞃenꝺl, *a bowl*, Saxon.) To roll; to bowl along (*Addison*).

TRU′NDLE. *s.* (ꞇꞃenꝺl, Saxon.) Any round rolling thing.

TRU′NDLE-TAIL. *s.* Round-tail (*Shakspeare*).

TRUNK, in botany. Truncus. Anciently, and in common English, trunk is put for the stem, body, stock, or bole of a tree: for which Linnéus uses the word caudex. He applies truncus to the stem or main body of vegetables in general; and explains it to be—that which produces the leaves and fructification; or the organ multiplying the plant. The stem or trunk of herbs he names caulis. When it elevates the fructification, and not the leaves, he calls it scapus, scape or shaft. The stem of corn and grasses, having a peculiar structure, he names culmus, culm or straw. Stipes is the base of a frond; or a stem passing into leaves, or not distinct from the leaves. See STEM.

TRUNK. *s.* 1. The body without the limbs of an animal (*Shakspeare*). 2. The main body of any thing (*Ray*). 3. A chest for clothes; a small chest commonly lined with paper (*Dryden*). 4. The proboscis of an elephant, or other animal (*Milton*). 5. A long tube through which pellets of clay are blown (*Bacon*).

To TRUNK. *v. a.* (*trunco*, Latin.) To truncate; to maim; to lop: obsolete (*Spenser*).

TRUNK-FISH, in ichthyology. See OSTRACION.

TRUNK-HOSE. *s.* (*trunk* and *hose.*) Large breeches formerly worn (*Prior*).

TRU′NKED. *a.* (from *trunk.*) Having a trunk (*Howel*).

TRU′NNIONS. *s.* (*trognons*, Fr.) The knobs or bunchings of a gun, that bear it on the cheeks of a carriage (*Bailey*).

TRURO, a borough in Cornwall, governed by a mayor, with a market on Wednesday and Saturday. It is a stannary town, and the chief business is in shipping tin and copper ore, found in abundance in its neighbourhood. Here, after the battle of Naseby, the forces of Charles I. under lord Hopeton, surrendered to general Fairfax. Truro is seated between the rivers Kenwyn and St. Allen, at the head of Falmouth haven, 10 miles N. of Falmouth, and 257 W. by S. of London.

TRU′SION. *s.* (*trudo*, Latin.) The act of thrusting or pushing (*Bentley*).

TRUSS, a bundle, or certain quantity of hay, straw, &c. A truss of hay contains 56 pounds, or half an hundred weight: 36 trusses make a load.

TRUSS is also used for a sort of bandage or ligature made of steel, or the like matter, wherewith to keep up the parts in those who have hernias or ruptures.

TRUSS, in a ship, a machine employed to pull a yard home to its respective mast, and retain it firmly in that position.

To TRUSS. *v. a.* (*trousser*, French.) To pack up close together (*Spenser*).

TRUST. *s.* (*traust*, Runic.) 1. Confidence; reliance on another (*Swift*). 2. Charge received in confidence (*Dryden*). 3. Confident opinion of any event (*Milton*). 4. Credit given without examination (*Locke*). 5. Credit on promise of payment (*Raleigh*). 6. Something committed to one's faith (*Kettlewell*). 7. Deposit; something committed to charge, of which an account must be given (*Swift*). 8. Confidence in supposed honesty (*Tobit*). 9. State of him to whom something is entrusted (*Clarendon*).

To TRUST. *v. a.* (from the noun.) 1 To place confidence in; to confide in (*B. Jonson*). 2. To believe; to credit (*Shakspeare*). 3. To admit in confidence to the power over any thing (*Taylor*). 4. To commit with confidence (*Dryden*). 5. To venture confidently (*Milt.*). 6. To sell upon credit.

To TRUST. *v. n.* 1. To be confident of something future (*Raleigh*). 2. To have confidence; to rely; to depend without doubt (*Isaiah*). 3. To be credulous; to be won to confidence (*Shakspeare*). 4. To expect (*L'Estrange*).

TRUSTE′E. *s.* (from *trust.*) 1. One entrusted with any thing (*Taylor*). 2. One to whom something is committed for the use and behoof of another (*Dryden*).

TRU′STER. *s.* (from *trust.*) One who trusts (*Shakspeare*).

TRU′STINESS. *s.* (from *trusty.*) Honesty; fidelity; faithfulness (*Grew*).

TRU′STLESS. *a.* (from *trust.*) Unfaithful; unconstant; not to be trusted (*Spenser*).

TRU′STY. *a.* (from *trust.*) 1. Honest; faithful; true; fit to be trusted (*Addison*). 2. Strong; stout; such as will not fail (*Dryden*).

TRUTH. *s.* (ꞇꞃeoꞃða, Saxon.) 1. The contrary to falsehood; conformity of notions to things (*Locke*). 2. Conformity of words to thoughts (*Milton*). 3. Purity from falsehood (*Shakspeare*). 4. Right opinion (*Harle*). 5. Fidelity; constancy. 6. Honesty; virtue (*Shakspeare*). 7. It is used sometimes by way of concession (*Matthew*). 8. Exactness; conformity to rule (*Mortimer*). 9. Reality; real state of things (*Hooker*). 10. *Of a* TRUTH, or *in* TRUTH. In reality; certainly (*Kings*).

TRUTINATION. *s.* (*trutina*, Lat.) The act of weighing; examination by the scale (*Brown*).

TRUXALIS, in the entomology of Fabricius, a tribe of the genus Gryllus; which see.

TRUXILLO, a town of Spain, in Estremadura, with a citadel on the top of a hill. It is the birthplace of the noted Francis Pizarro, and situated on the side of a hill, near the river Magasca, 70 miles N.E. of Badajoz, and 90 S.W. of Toledo. Lon. 5. 43 W. Lat. 39. 26 N.

Truxillo, a city and seaport of Peru, in the audience of Lima, and the see of a bishop. It was built by Francis Pizarro, in 1553. In its territory are above 50,000 native Americans, who are tributary to Spain. It is surrounded by a wall, and seated in a fertile country, on a small river, near the Pacific ocean, 300 miles N.W. of Lima. Lon. 79. 5 W. Lat. 8. 1 S.

Truxillo, a seaport of Mexico, in Honduras, on the gulf of that name. It stands three miles from the sea, between two rivers, the mouths of which, and some islands before them, form the harbour. It is 140 miles N.E. of Valladolid. Lon. 86. 30 W. Lat. 15. 46 N.

To TRY. *v. a.* (*trier*, Fr.) 1. To examine; to make experiment of (*Shakspeare*). 2. To experience; to essay; to have knowledge or experience of (*Dryden*). 3. To examine as a judge 4. To bring before a judicial tribunal. 5. To bring to a decision (*Dryden*). 6. To act on as a test (*Shakspeare*). 7. To bring as to a test (*Milton*). 8. To essay; to attempt (*Milton*). 9. To purify; to refine (*Milton*). 10. To use as means (*Swift*).

To Try. *v. n.* To endeavour; to attempt; to make essay (*Wotton*).

TRYPAN. (τρυπανον.) See Trepan.

TRYPHIODORUS, an ancient Greek poet, who lived some time between the reigns of Severus and Anastasius. His writings were very numerous; yet none of them have come down to us, except an epic poem, on which Mr. Addison has made some entertaining remarks in the Spectator, No. 63. It is a poem in 24 books on the destruction of Troy, from which he excluded the α in the first book, the β in the second, and the γ in the third, &c. The first edition of this extraordinary work was published by Aldus at Venice, with Quintus Calabar's paralipomena, and Coluthus's poem on the rape of Helen. It has been since reprinted at several places, particularly at Francfort, in 1580, by Frischlinus; who not only corrected many corrupt passages, but added two Latin versions, one in verse and the other in prose. That in verse was reprinted in 1742, with the Greek, at Oxford, in 8vo. with an English translation in verse, and Notes, by Mr. Merrick.

TSI-NAN, a city of China, capital of Chang-tong. It is much respected by the Chinese, on account of its having been formerly the residence of a long series of kings, whose tombs, rising on the neighbouring mountains, afford a beautiful prospect. It is seated on the river Tsi or Tsing-ho, 230 miles S. by E. of Peking. Lon. 117. 25 E. Lat. 36. 46 N.

TSI-NING, a city of China, of the second rank, in Chang-tong, situate on the grand canal, 275 miles S. of Peking. Lon. 116. 24 E. Lat. 35. 24 N.

TSIN-TCHEOU, a city of China, of the first rank, in Chang-tong, 250 miles S.S.E. of Peking. Lon. 119. 2 E. Lat. 36. 40 N.

TSONG-MING, an island of China, 15 miles long and 10 broad, lying at the mouth of the Kian-ku, and separated from the province of Kiang-nan, by two channels, 13 miles broad. Its principal revenue arises from salt, which is made in such abundance, on the N. side of the island, that it can supply most of the neighbouring countries. It contains only one city, of the third class, but villages are very numerous. The country is delightful, and intersected by many canals. The city, of the same name, is situate at its S.E. end. Lon. 121. 55 E. Lat. 30. 15 N.

TUAM, a city of Ireland, in the county of Galway, and an archbishop's see, though now a small place. The cathedral serves as a parish church. It is 20 miles N.N.E. of Galway, and 25 W.S.W. of Roscommon.

TUB. *s.* (*tobbe*, *tubbe*, Dutch.) 1. A large open vessel of wood (*Milton*). 2. A state of salivation; so called, because the patient was formerly sweated in a tub (*Shakspeare*).

Tub-fish. See Trigla.

TUBA EUSTACHIANA, in anatomy, the Eustachian tube; so called because it was first described by Eustachius. The auditory tube. This tube arises in each ear from the anterior extremity of the tympanum by means of a bony semi-canal; runs forwards and inwards, at the same time becoming gradually smaller; and after perforating the petrous portion of the temporal bone terminates in a passage, partly cartilaginous and partly membranous, narrow at the beginning, but becoming gradually larger, and ending in a pouch behind the soft palate. It is through this orifice that the pituitary membrane of the nose enters the tympanum. It is always open, and affords a free passage for the air into the tympanum; hence persons hear better with their mouth open.

Tuba Fallopiana. The Fallopian tube, first described by Fallopius. The uterine tube. A canal included in two laminæ of the peritonæum, which arises at each side of the fundus of the uterus, passes transversely, and ends with its extremity turned downwards at the ovarium. Its use is to grasp the ovúm, and convey the prolific vapour to it, and to conduct the fertilized ovum into the cavity of the uterus.

TUBE, in general, pipe, conduit, or canal; a cylinder hollow withinside, either of lead, iron, wood, glass, or other matter, for the air, or some other fluid, to have a free passage, or conveyance, through. Small silver or leaden tubes are frequently used, by surgeons, to draw of blood, matter, or water, from the different parts of the body: they are made of various sizes and shapes.

TUBE, in astronomy, is sometimes used for a telescope, or more properly, for that part thereof into which the lenses are fitted, and by which they are directed and used.

We have now certain articles in domestic use, as toasting-forks, &c. made on the principle of telescope tubes.

TUBE-WORM, in helminthology. See SIPUNCULUS.

TUBER, in botany, a genus of the class cryptogamia, order fungi. Fungus nearly globular, fleshy, veiny internally. Three species, all common to our own country; of which one is well worthy of particular notice, tuber globulosum, the common truffle of our dinner-tables, globular, solid, muricate, blackish, rootless.

TUBERCLE. (from *tuber.*) In botany, a little knob, like a pimple.—Fructificatio constans punctis scabris ex pulvere quasi congestis. A little knob, or rough point, on the leaves of some lichens, supposed to be the fructification. Hence such are said to be tubercled, tuberculati.

TUBERCLE. (*tuberculum.*) A hard superficial tumour, circumscribed and permanent; or proceeding very slowly to suppuration.

TUBERCULA QUADRIGEMINA. Corpora quadrigemina. Eminentiæ quadrigeminæ. Four white oval tubercles of the brain, two of which are situated on each side over the posterior orifice of the third ventricle and the aqueduct of Sylvius. The ancients called them nates and testes, from their supposed resemblance.

TUBERCULARIA, in botany, a genus of the class cryptogamia, order fungi. Fungus gelatinous; cap tubercled; stem thick, full, closely appressed, bearing the seeds on the upper surface. Five species; one of them only, tubercularia vulgaris, common to our own country.

TUBERCULUM LOWERI, in anatomy. An eminence in the right auricle of the heart where the two venæ cavæ meet; so called from Lower, who first described it.

TUBERO. The most celebrated of this name is Q. Ælius, a Roman consul, son-in-law of Paulus, the conqueror of Persia. He is celebrated for his poverty, in which he seemed to glory, as well as the rest of his family. Sixteen of the Tuberos, with their wives and children, lived in a small house, and maintained themselves with the produce of a little field, which they cultivated with their own hands.

TUBEROSE, in botany. See POLYANTHUS.

TU'BEROUS. *a.* (*tubereux*, Fr. from *tuber*, Lat.) Having prominent knots or excrescences (*Woodward*).

TUBIFERA, in botany, a genus of the class cryptogamia, order fungi. Fungus with cases superimposed on an expanded membrane, and connected with each other; seeds nearly naked. Three species; all exotics.

TUBINGEN, a fortified town of Suabia, in the former duchy and present kingdom of Wirtemburg, with a university, and a castle. Here is a large house called New Bau, where a certain number of students in law are lodged and boarded gratis: and in the townhouse is a very curious clock. It is seated on the Neckar, in a country abounding in corn and wine, 20 miles S. of Stutgard, and 50 E. by S. of Strasburg. Lon. 9. 4 E. Lat. 48. 30 N.

TUBIPORA. Tubipore. In zoology, a genus of the class vermes, order zoophyta. Animal (most probably) a nereis: corol consisting of erect, hollow, cylindrical, parallel, aggregate tubes. Ten species; inhabiting the shores of the Baltic, and other northern seas, Indian and American seas. We shall give a specimen or two.

1. T. musica. With fasciculate, connected tubes, and transverse, distant, membranaceous dissepiments. Inhabits Indian and American seas; fixed to rocks and other corals; bright scarlet, consisting of an assortment of upright parallel tubes, rising over each other by stages like the cells of a honeycomb, divided by transverse partitions. The Indians use it in cases of strangury and wounds inflicted by venomous animals.

2. T. serpens. With erect, cylindrical, very short, distant, axillary tubes, and a creeping, dichotomous, divaricate base. Cast frequently on the shores of the European, Baltic, and American seas, and the only species found on our own coasts; generally discovered adhering to the stalks of fuci and corallines; minute; white or pale red; the incrustations composed of circular rows of small and almost parallel tubes.

For the economy and mode of increase of this genus, see the article MADREPORA.

TUBIPORE. See TUBIPORA.

TU'BULAR. *a.* (from *tubus*, Latin.) Resembling a pipe or trunk; consisting of a pipe; long and hollow; fistular (*Grew*).

TUBULAR PENDULUM. See PENDULUM.

TUBULARIA, in zoology, a genus of the class vermes, order zoophyta. Stem tubular, simple or branched, fixed by the base: animal proceeding from the end of the tube, and having its head crested with tentacles. Twenty-six species; inhabiting the seas of Europe and America, chiefly the Mediterranean: one or two species found in stagnant waters; nine on our own coasts. The following are most worthy of notice:

1. T. magnifica. Tube simple, whitish; tentacles very numerous, variegated with red and white. Inhabits the West Indies, adhering to rocks, and is by far the largest and most splendid of its genus: like the rest of its tribe, it has the power of withdrawing its tentacles within the tube, and the tube within the rock on which it resides: in some degree it seems to connect the genera tubularia and amphitrite, having the annulated wrinkled tube of the one, and the retractile, tentaculated body of the other.

2. T. splachnea. Stems capillary, very sim-

ple, each with a smooth, terminal, membranaceous cup or target. Inhabits the Mediterranean; two inches long, and not thicker than a horse-hair; horn-colour, with numerous tubes from the same root.

3. T. repens. Crested, with radiate cirri on each side; sheath projecting; tube opake, procumbent. Inhabits the stagnant waters of northern Europe, and is often found seated on the leaves and stems of the nymphæa, resembling a white gelatinous mass. See Nat. Hist. Pl. CLXXV.

TU'BULATED. Tu'bulous. *a.* (from *tubulus*, Latin.) Fistular; longitudinally hollow (*Derham*).

TU'BULE. *s.* (*tubulus*, Latin.) A small pipe, or fistular body (*Woodward*).

TUBULOUS COMPOUND FLOWER. Tubulosus flos. In botany. Composed wholly of tubulous florets. The same with flosculosus flos of Tournefort. Exemplified in tansey, and other naked discous flowers.—Tubulosus flosculus. A tubulous floret. Having a bell-shaped border, with five reflex segments, rising from a tube. These are the regular-shaped little component flowers in the disk of compound flowers: as in the sun-flower, daisy, &c.—Tubulosus caulis. A hollow stem.—Tubulosum folium. A hollow leaf: as in onion.

TUBUS, in botany, a hollow pipe. Put for the lower, narrow, hollow part of a monopetalous or one-petalled corol, by which it is fixed into the receptacle. Vaillant and Haller call the style tuba, from its resemblance to a trumpet.

TUCK. *s.* (*tweca*, Welsh, a knife; *estoc*, French; *stocco*, Italian.) 1. A long narrow sword (*Shakspeare*). 2. A kind of net (*Carew*).

To Tuck. *v. n.* (from *trucken*, German, to press. *Skinner*.) 1. To gather into a narrower compass; to crush together; to hinder from spreading (*Addison*). 2. To enclose, by tucking clothes round (*Locke*).

To Tuck. *v. a.* To contract (*Sharp*).

TU'CKER. *s.* A small piece of linen that shades the breast of women (*Addison*).

Tucker (Abraham, Esq.), a curious and original thinker, was a gentleman of affluent fortune, and author of The Light of Nature pursued, nine vols. 8vo.; of which the five first volumes were published by himself, in 1768, under the assumed name of Edward Search, Esq.; and the four last after his death, in 1777, as The posthumous Work of Abraham Tucker, Esq. published from his manuscript as intended for the press by the author. Mr. Tucker lived at Betchworth-castle, near Dorking, in Surrey; an estate which he purchased in the early part of his life. He married the daughter of Edward Barker, esq. by whom he had two daughters; one of whom married sir Henry St. John, and died in his lifetime; the other survived, and now lives, or lately did, at Betchworth-castle. He lost his eyesight a few years before his death, which happened in 1775. To describe him as a neighbour, landlord, father, and magistrate, it would be necessary to mention the most amiable qualities in each. It is unnecessary to add, that he was very sincerely regretted by all who had the pleasure of his acquaintance, and who stood connected with him in any of those relations.

Tucker (Josiah), a celebrated English divine, was born at Largharne, in Caermarthenshire, in 1711, and educated at St. John's college, Oxford, where he took his degree of D.D. in 1759. On entering into orders he settled at Bristol, and became rector of St. Stephen's, in that city, and prebend in the cathedral. In 1758 he was preferred to the deanery of Gloucester. He was an able writer on commercial, political, and theological subjects. At the beginning of the American war he laboured to convince the government of the impolicy of that contest, and that it would be beneficial to this country to concede to the colonies their independence. He was much abused for this opinion at the time, but the event has vindicated his judgment.

It should be recorded to Dr. Tucker's praise, that though enjoying but very moderate preferment (for to a man of no paternal estate, or other ecclesiastical dignity, the deanery of Gloucester is no very advantageous situation), he was notwithstanding a liberal benefactor to several public institutions, and a distinguished patron of merit. The celebrated John Henderson, of Pembroke-college, Oxford, was sent to the university, and supported there, at the dean's expence, when he had no means whatever of gratifying his ardent desire for study. We shall mention another instance of generosity in this place, which reflects the greatest honour upon the dean. About the year 1790 he thought of resigning his rectory in Bristol, and, without communicating his design to any other person, he applied to the chancellor, in whose gift it is, for leave to quit it in favour of his curate, a most deserving man, with a large family. His lordship was willing enough that he should give up the living, but he refused him the liberty of nominating his successor. On this the dean resolved to hold the living himself till he could find a fit opportunity to succeed in his object. After weighing the matter more deliberately, he communicated his wish to his parishioners, and advised them to draw up a petition to the chancellor in favour of the curate. This was accordingly done, and signed by all of them, without any exception, either on the part of the dissenters or others. The chancellor being touched with this testimony of love between a clergyman and his people, yielded at last to the application; in consequence of which the dean cheerfully resigned the living to a successor well qualified to tread in his steps. After that time he resided chiefly at Gloucester, viewing his approaching dissolution with the placid mind of a Christian, conscious of having done his duty both to God and man. He died in November, 1799. The following we believe to be a tolerably correct list of his works.

Theological and controversial.—1. A Sermon, preached before the Governors of the Infirmary of Bristol, 1745. 2. Letters in behalf of the Naturalization of the Jews. 3. Apology for the Church of England, 1772. 4. Six Sermons, 12mo. 1773. 5. Letter to Dr. Kippis on his Vindication of the Protestant Dissenting Ministers. 6. Two Sermons and Four Tracts. 7. View of the Difficulties of the Trinitarian, Arian, and Socinian Systems, and Seventeen Sermons, 1777.

Political and commercial.—8. A pamphlet on the Turkey Trade. 9. A brief View of the Advantages and Disadvantages which attend a Trade with France. 10. Reflections on the Expediency of naturalizing foreign Protestants, and a Letter to a Friend on the same Subject. 11. The Pleas and Arguments of the Mother Country and the Colonies stated. 12. A Letter to Mr. Burke. 13. Quere, Whether a Connection with, or Separation from, America, would be for national Advantage? 14. Answers to Objections against the Separation from America. 15. A Treatise on Civil Government. 16. Cui Bono? 17. Four Letters on national Subjects. 18. Sequel to Sir William Jones on Government. 19. On the Dispute between Great Britain and Ireland. 20. Several Papers under the Signature of Cassandra, &c. on the Difficulties attendant on an Invasion. 21. A Treatise on Commerce (Mr. Coxe, in his Life of Sir Robert Walpole, says that this was printed, but never published).

Miscellaneous.—22. Directions for Travellers. 23. Cautions against the Use of Spirituous Liquors. 24. A Tract against the Diversions of Cock-fighting, &c.

TUCUMAN, an extensive government of Spanish South America, lying between Chili and Paraguay, to the E. of the Andes, and W. of the Rio de la Plata. This province, with the country S. of that river, forms an extensive plain, almost without a tree. The soil is a deep fertile mould, watered by many streams from the Andes, and clothed in perpetual verdure. In this rich pasturage, the horses and cattle, imported from Europe, have multiplied to an almost incredible degree. This has enabled the inhabitants not only to open a lucrative trade with Peru, by supplying it with cattle, horses, and mules, but to carry on a commerce, equally beneficial, by the exportation of hides to Europe; notwithstanding which, the towns in this country are no better than paltry villages, to which the Spaniards have endeavoured to add some dignity, by erecting them into bishoprics. Tucuman is under the jurisdiction of the new viceroyalty at Buenos Ayres.

TUCUYO, a town of Terra Firma, in Venezuela, and in a valley of the same name. A river runs through the middle of the valley, and the soil abounds in sugar-canes, cotton, and all the necessaries of life. Lon. 69. 2 W. Lat. 7. 31 N.

TUDDINGTON, a town in Bedfordshire, with a market on Saturday, five miles N. of Dunstable, and thirty-eight N.N.W. of London. Lon. 0. 32 W. Lat. 52. 0 N.

TUDELA, a considerable town of Spain, in Navarre, with a castle. It is seated in a country that produces good wine, on the river Ebro, over which is a handsome bridge, 45 miles N.W. of Saragossa, and 140 N.E. of Madrid. Lon. 1. 10 W. Lat. 42. 9 N.

TU'EL. *s.* (*tuyeau*, French.) The anus.

TU'ESDAY. *s.* (ꞇueꞅꝺaȝ, Saxon; ꞇuý, Sax. is Mars.) The third day of the week.

TUFA, in mineralogy, a genus of calcareous earths, for which see TOPHUS.

TUFT. *s.* (*tuffe*, French.) 1. A number of threads or ribands, flowery leaves, or any small bodies joined together (*Dryden*). 2. A cluster; a plump (*Milton*).

To TUFT. *v. a.* To adorn with a tuft (*Thomson*).

TUFTA'FFETY. *s.* (from *tufted* and *taffety*.) A villous kind of silk (*Donne*).

TU'FTED. *a.* (from *tuft*.) Growing in tufts or clusters (*Milton*).

TU'FTY. *a.* (from *tuft*.) Adorned with tufts (*Thomson*).

To TUG. *v. a.* (ꞇeoȝan, Saxon.) 1. To pull with strength long continued in the utmost exertion; to draw (*Roscommon*). 2. To pull; to pluck (*Hudibras*).

To TUG. *v. n.* 1. To pull; to draw (*Sandys*). 2. To labour; to contend; to struggle (*Shakspeare*).

TUG. *s.* (from the verb.) Pull performed with the utmost effort (*Dryden*).

TU'GGER. *s.* (from *tug*.) One that tugs or pulls hard.

TUI'TION. *s.* (*tuitio*, from *tueor*, Latin.) Guardianship; superintendent care; care of a guardian or tutor (*Locke*).

TULBAGIA, in botany, a genus of the class hexandria, order monogynia. Corol inferior, funnel-form, with a six-cleft border; nectary one or three-leaved, crowning the throat; the leaflets bifid, and as large as the border; capsule superior. Two species; natives of the Cape.

TULIP, in botany. See TULIPA.

TULIP (African), in botany. See HÆMANTHUS.

TULIP (Checkered), in botany. See FRITILLARIA.

TULIP-FLOWER, in botany. See BIGNONIA.

TULIP-TREE, in botany. See LIRIODENDRON.

TULIPA. Tulip. In botany, a genus of the class hexandria, order monogynia. Corol six-petalled, campanulate; styleless; capsule superior, three-celled; seeds flat. Five species, as follow:

1. T. sylvestris. Wild or yellow tulip. A native of Europe, and found occasionally in our chalk-pits.

2. T. Gesneriana. Common garden tulip. A native of Cappadocia, or the south of Europe.

3. T. suaveolens. Sweet-smelling tulip. South of Europe.

4. T. biflora. Double-flowered tulip. A native of Russia.

5. T. breyniana. Cape tulip. A native of the Cape of Good Hope.

The first two only are cultivated; though the former not very often. It is distinguished from the latter by the flower being nodding, the leaves narrow, the base of the stamens and tips of the petals hairy, the pollen yellow instead of black, the anthers remarkably long, and the flower fragrant.

The garden tulip, or Gesner's Turkey tulip of Cappadocia, as it is often called, is in its different and splendid varieties possessed of almost all colours, and diversities in their modes of being blended. The colours in highest estimation are the blacks, golden yellows, purple-violets, rose, and vermilion; while those that possess most of these, or any three of them, and are striped with them in distinct and unmixed colours, the streaks being regular, with little or no tinge of the breeder, may be called the most perfect flowers. It is but rarely that tulips of this character are to be met with.

Nature often effects this variation of colour by her own sportive efforts; but her efforts are much assisted by an annual change of soil in the plants that are selected as breeders, from a poor to a richer, and from a light to a heavier; for the formative effort is hereby broken or impeded, or changed in its regular action; and the result of this derangement and morbid action is that diversity of hue which by the florist, and indeed by mankind in general, is regarded as the highest ornament of this superb corol.

The double tulip is often a variety of the garden tulip: it has a very splendid appearance, but is less valued than the more perfect single flowers, as affording less variety of colours; and the colours, at the same time, less rich and complete. The best tulip roots, and indeed the best bulbous roots of every kind, are obtained from Holland: the Dutch gardeners having long studied this department of botany more than those of any other nation.

The general characters of a good tulip are, that the stem should be strong and tall; the flower should consist of six petals, three within and three without; and the former should be larger than the latter: the bottom of the flower should be proportioned to the top, and the ends of the leaves should be rounded, not pointed: the leaves, when opened, should neither turn inward nor bend outward, but stand erect; and the whole flower should be of a middling size, neither too large nor too small: the stripes must be small and regular, and should all arise from the bottom of the flower: the chives also should not be yellow, but of a brown colour.

Tulips are generally divided into three classes, according to their times of flowering; the early, the middling, and the late. The early ones are not near so high as the late, but they are valued for their earliness, as they flower in February. The roots of these are to be planted in the beginning of September, under a warm pale or hedge. The proper soil for them is pasture-land, with the turf rotted among it, and a mixture of one-fourth part sand: this should be laid about ten inches deep, and should be renewed every year. If the weather is very severe when they first appear, they should be covered with mats, as also at night, when they are in flower, if it be very frosty. When their flowering is over, and their leaves decay, the roots should be taken up and laid in a dry place, and afterwards cleaned, and laid up safe from vermin till the September following. The late blowers are propagated from what they call breeders, which are plain flowers brought over principally from Flanders, and these by culture are changed into striped or variegated ones. They are also propagated by sowing the seeds; but this requires great care, as in the raising all other fine flowers from seeds. The seeds must be saved from the choicest flowers, and sowed in shallow pans or boxes of earth in September. The spring following they appear like the leaves of grass or young onions; and, after standing two or three months, these decay. The boxes are to be kept clear of weeds, and removed to different situations, where they may enjoy the morning sun, and be defended from sharp winds and frosts. At the Michaelmas of the following year, they are to be removed out of the boxes into beds, where they should be planted two inches deep, and at two inches distance from one another. In October an inch depth of new earth should be sifted on them, and they are to remain two years in these beds. At the end of this time they will flower, and the best of them must be marked with sticks, that their roots may be distinguished when the leaves are decayed. The breeders being thus raised, are to be shifted every year into fresh earth, and they will in time break out into very fine stripes. The earth they are planted in should be every year of a different kind. The beds must be laid eighteen inches deep with pasture-land, as before directed: this should be laid in first, ten inches thick, and on this the roots should be placed in regular order, and at even distances, and then the remaining eight inches should be laid over these; the top of the bed being a little rounded to throw off the wet. Thus they are to remain till the buds appear; and then, if the nights are very severe, they are to be sheltered by covering them with mats. The flowers which break out into fine stripes here should be separated afterwards from the rest; and if they hold on their beauty to the last, they will never return to plain flowers again, and the off-sets from the roots of these will always produce such flowers. When the tulips have flowered, their heads should be broken off, to prevent their seedling, which would make them flower much the worse the next year. See BOTANY, Pl. CLXXVII.

TULLAMORE, a town of Ireland, in King's county, situate on a river of the same name, 44 miles W.N.W. of Dublin.

TULLES, a commercial town of France, in the department of Correze, with a bishop's see. The cathedral is famous for its steeple, which is very high and curious. It is seated at the confluence of the Borreze and Solane, partly on a mountain, and partly below it, in a country surrounded by mountains and precipices, 37 miles S.E. of Limoges, and 62 S.W. of Clermont. Lon. 1. 42 E. Lat. 45. 23 N.

TULLIA, daughter of Cicero, who makes frequent mention of her in his letters. She was first married to Caius Piso, a man of genius and eloquence, and greatly attached to the interest of his father-in-law. She afterwards espoused Furius Crassipes, and separated from him for a cause unknown. She was a third time wedded to Cornelius Dolabella, while her father was governor of Cilicia: the fruit of this last marriage was nothing but unhappiness. She died B. C. 44. Cicero wrote a book upon her death, which is lost.

TULLIUS HOSTILIUS, the third king of the Romans, who succeeded Numa Pompilius. He destroyed the town of Alba, and carried its inhabitants to Rome; he was equally successful against the Latins. He died B. C. 640, after reigning 32 years.

To TU'MBLE. *v. n.* (*tomber*, French; *tommelen*, Dutch; *tombolare*, Italian.) 1. To fall; to come suddenly and violently to the ground (*Shakspeare*). 2. To fall in great quantities tumultuously (*Bacon*). 3. To roll about (*Sidney*). 4. To play tricks by various librations of the body (*Rowe*).

To TU'MBLE. *v. a.* 1. To turn over; to throw about by way of examination (*Collier*). 2. To throw by chance or violence (*Locke*). 3. To throw down (*Dryden*).

TU'MBLE. *s.* (from the verb.) A fall (*L'Estrange*).

TU'MBLER. *s.* (from *tumble.*) 1. One who shows postures by contortions of body, or feats of activity (*Wilkins*). 2. A large drinking glass.

TUMBLER PIGEON. See COLUMBA.

TUMBRELL, TUMBRELLUM, or TURBICHETUM, is an engine of punishment, which ought to be in every liberty that hath the view of frank pledge, for the correction of scolds and unquiet women.

TUMBREL, a machine employed chiefly in the county of Lincoln; for the purpose of giving food to sheep, during the winter.

In the 4th vol. of the Repertory of Arts, &c. we meet with a description of a contrivance which is equally simple and useful. It consists of a circular cage or crib, which may be made of willow, osiers, or similar pliant brushwood. The whole is ten feet in circumference, being closely wattled to the height of one foot, above which it is left open for the space of about eighteen inches; when it is again wattled to the height of eight or nine inches; an opening, eighteen inches broad, being left at the top for the purpose of putting in turnips, or other provender. The staves, forming the skeleton of the machine above described, are ten inches apart, so that twelve sheep may feed at one time from each tumbrel.

Considerable advantages are derived from this method of feeding sheep; as it greatly reduces the expence of provender, which is thus prevented from being soiled with dung, or trodden under foot. In such a state of separation, the stronger animals cannot drive away the weaker sheep; each being secured by the head, while they are eating. Further, the construction of the tumbrel being attended with no difficulties, it may be readily procured, and be daily conveyed to any part of a farm: if proper care be taken, this utensil may be preserved in constant use, for eight or ten years.

TUMEFA'CTION. *s.* (*tumefactio*, Lat.) Swelling (*Arbuthnot*).

To TU'MEFY. *v. a.* (*tumefacio*, Latin.) To swell; to make to swell (*Sharp*).

TU'MID. *a.* (*tumidus*, Latin.) 1. Swelling; puffed up. 2. Protuberant; raised above the level (*Milton*). 3. Pompous; boastful; puffy; falsely sublime (*Boyle*).

TUMORES. (*tumor*, from *tumeo*, to swell.) Tumours. An order in the class locales of Cullen's nosology, comprehending partial swellings without inflammation.

TU'MOROUS. *a.* (from *tumour.*) 1. Swelling; protuberant (*Wotton*). 2. Fastuous; vainly pompous; falsely magnificent (*Ben Jonson*).

TU'MOUR. *s.* (*tumor*, Latin.) 1. A morbid swelling (*Wiseman*). 2. Affected pomp; false magnificence; puffy grandeur; swelling mien; unsubstantial greatness (*L'Estrange*).

To TUMP. (among gardeners.) To fence trees about with earth.

To TU'MULATE. *v. n.* (*tumulo*, Lat.) To swell (*Boyle*).

TU'MULOSE. *a.* (*tumulosus*, Latin.) Full of hills (*Bailey*).

TUMULO'SITY. *s.* (*tumulus*, Lat.) Hilliness (*Bailey*).

TU'MULT. *s.* (*tumulte*, Fr. *tumultus*, Lat.) 1. A promiscuous commotion in a multitude (*Pope*). 2. A multitude put into wild commotion. 3. A stir; an irregular violence; a wild commotion (*Addison*).

TUMU'LTUARILY. *ad.* (from *tumultuary.*) In a tumultuary manner.

TUMU'LTUARINESS. *s.* (from *tumultuary.*) Turbulence; inclination or disposition to tumults or commotions (*King Charles*).

TUMU'LTUARY. *a.* (*tumultuaire*, Fr. from *tumult.*) 1. Disorderly; promiscuous; confused (*Bacon*). 2. Restless; put into irregular commotion (*Atterbury*).

To TUMU'LTUATE. *v. n.* (*tumultuor*, Lat.) To make a tumult.

TUMULTUA'TION. *s.* (from *tumultuate.*) Irregular and confused agitation (*Boyle*).

TUMU'LTUOUS. *a.* (from *tumult*; *tumultueux*, French.) 1. Violently carried on by disorderly multitudes (*Spenser*). 2. Put into violent commotion; irregularly and confusedly agitated (*Addison*). 3. Turbulent; violent (*Knolles*). 4. Full of tumults (*Sid.*).

TUMU'LTUOUSLY. *ad.* (from *tumultu-*

ous.) By act of the multitude; with confusion and violence (*Bacon*).

TUMULUS. See BARROW, and CAIRNS.

TUN, a large vessel or cask, of an oblong form, biggest in the middle, and diminishing towards its two ends, girt about with hoops, and used for stowing several kinds of merchandise, for convenience of carriage; as brandy, oil, sugar, skins, hats, &c.

TUN is also the name of a measure. A tun of wine is four hogsheads; of timber, a square of 40 solid feet; and of coals, 20 cwt.

TUN, or **TON,** is also a certain weight whereby the burden of ships, &c. are estimated.

TUN, TON, in the ends of words or names of places, signifies a town, village, or dwelling-place: from the Saxon *tun, sepes, vallum, villa, vicus, oppidum*; and this from *don*, or *dun*, a hill, where they formerly built towns.

To **TUN.** *v. n.* (from the noun.) To put into casks; to barrel (*Bacon*).

TU'NABLE. *a.* (from *tune.*) Harmonious; musical (*Holder*).

TU'NABLENESS. *s.* (from *tunable.*) Harmony; melodiousness.

TU'NABLY. *ad.* (from *tunable.*) Harmoniously; melodiously.

TUNBRIDGE, a town in Kent, with a market on Friday, seated on the Tun, one of the five branches of the Medway, over each of which is a stone bridge. Here are the ruins of a large castle, erected by Richard, earl of Clare, natural son of Richard I. duke of Normandy; and here is a famous freeschool, founded by sir Andrew Judd, lord mayor of London, in 1551. It is twelve miles W.S.W. of Maidstone, and 30 S.S.E. of London.

TUNBRIDGE WELLS, a town in Kent, much resorted to on account of its chalybeate waters, discovered in 1606, by Dudley, lord North, who recovered from a deep consumption by drinking them. It is seated at the bottom of three hills, called Mount Sinai, Mount Ephraim, and Mount Pleasant, on which are scattered some good houses, orchards, and gardens; and as the country is naturally wild, the effect of the whole is romantic and picturesque. Here are all the buildings requisite for the accommodation of the nobility and gentry, with a chapel of ease, a market, and shops noted for their elegant turnery ware. One mile and a half from the wells are some rocks, which in some parts are 75 feet high, the mean height 40, with surprising clefts and chasms between them, that they have the appearance of the hulks of large men of war, ranged close together. The wells are five miles S. of Tunbridge, and 35 S.S.E. of London.

TUNBRIDGE WATER. A chalybeate water, the analysis of which shows it to be a very pure water, as to the quantity of solid matter; and the saline contents (the iron excepted) are such as may be found in almost any water that is used as common drink. It is only as a chalybeate, and in the quantity of carbonic acid, that it differs from common water. Of this acid it contains 1-22d bulk. The general operation of this chalybeate water is to increase the power of the secretory system in a gradual, uniform manner, and to impart tone and strength to all the functions. It is recommended in a variety of complaints incident to the female sex, in menorrhagia, fluor albus, chlorosis, &c.

TUNE. *s.* (*toon*, Dutch; *ton*, Swedish; *tuono*, Italian; *tone*, French; *tonus*, Latin.) 1. *Tune* is a diversity of notes put together (*Bacon*). 2. Sound; note. See MUSIC and TONE. 3. Harmony; order; concert of parts (*K. Charles*). 4. State of giving the due sounds; as, *the fiddle is in* tune, or *out of* tune. 5. Proper state for use or application; right disposition; fit temper or humour (*Locke*). 6. State of any thing with respect to order (*Shakspeare*).

To **TUNE.** *v. a.* (from the noun.) 1. To put into such a state as that the proper sounds may be produced (*Dryden*). 2. To sing harmoniously (*Pope*). 3. To put into order so as to produce the proper effect.

To **TUNE.** *v. n.* 1. To form one sound to another (*Milton*). 2. To utter with the voice inarticulate harmony.

TU'NEFUL. *a.* (*tune* and *full.*) Musical; harmonious (*Dryden*).

TU'NELESS. *a.* (from *tune.*) Unharmonious; unmusical (*Cowley*).

TU'NER. *s.* (from *tune.*) One who tunes.

TUNGSTENUM. Tungsten. Wolfram. In mineralogy, a genus of the class metals. Greyish or brownish, internally steel-white, very brittle and hard, not attracted by the magnet: specific gravity 17·600: fusing with great difficulty, gradually changing from a black to a yellow oxyd when heated, which, with the addition of microcosmic salt, is at last converted into a blue glass; soluble in the nitric acid into a yellow oxyd. Two species.

1. T. calcareum Tungsten. Tungsten of lime. Jersten. Ponderous, lamellar, extremely brittle, yellowish-white or grey, digested with hot nitric acid becoming yellow. Found near Penguilly in Cornwall, in Saxony, and Bohemia, in tin mines, and is often mistaken for tin-stone; sometimes massive or disseminated, sometimes crystallized in double four-sided pyramids: it decrepitates but does not melt in a white heat; with borax it forms a colourless glass, but if the borax exceed, a brownish one: specific gravity from 5·800 to 6·028. contains, according to Scheele,

Oxyd of tungsten -	70
Lime - - - -	30
	100

2. T. magnesiatum. Wolfram. Very ponderous, lamellar, opake, of a blackish-brown colour, and reddish-brown streak, forming a greenish glass with borax. Found in Cornwall, Spain, Britany, Saxony, and Bohemia, in tin mines, massive, or crystallized in right-angled, four-sided tables, or six-sided compressed prisms, ending in four-sided summits: texture foliated, and easily separated into plates by percussion: infusible by the blowpipe,

and forms a deep red glass with microcosmic salt: specific gravity from 7·006 to 7·333: contains, according to Elhuyar,

Oxyd of tungsten	65
——— manganese	22
——— iron	13
	100

It is one of the hardest of the metals; for Vauquelin and Hecht could scarcely make any impression upon it with a file. It seems also to be brittle, and is the heaviest of the metals after gold and platinum.

It requires for fusion a temperature at least equal to 170° Wedgewood. It seems to have the property of crystallizing on cooling, like all the other metals.

It is not attracted by the magnet.

When heated in an open vessel it gradually absorbs oxygen, and is converted into an oxyd. Tungsten seems capable of combining with two different proportions of oxygen, and of forming two different oxyds, the black and the yellow.

The protoxyd or black oxyd may be obtained by heating the yellow oxyd for some hours in a covered crucible. The peroxyd or yellow oxyd, known also by the name of tungstic acid, is found native in wolfram, and may be obtained from it by boiling three parts of muriatic acid on one of wolfram. The acid is to be decanted off in about half an hour, and allowed to settle. A yellow powder gradually precipitates. This powder is to be dissolved in ammonia, the solution is to be evaporated to dryness, and the dry mass kept for some time in a red heat. It is then yellow oxyd in a state of purity. This oxyd has no taste. It is insoluble in water, but remains long suspended in that liquid, forming a kind of yellow milk, which has no action on vegetable colours. When heated in a platinum spoon it becomes dark green; but before the blowpipe on charcoal it acquires a black colour. It is composed of 80 parts of tungsten and 20 of oxygen. Its specific gravity is 6·12.

The sulphuret of tungsten is of a bluish black colour, hard, and capable of crystallizing. Phosphorous is capable of combining with tungsten; but none of the properties of the phosphuret have been ascertained.

The simple incombustibles do not seem capable of uniting with tungsten.

The Elhuyars alone attempted to combine tungsten with other metals. They mixed 100 grains of the metals to be alloyed with 50 grains of the yellow oxyd of tungsten and a quantity of charcoal, and heated the mixture in a crucible. The result of their experiments is as follows:

With gold and platinum the tungsten did not combine. With silver it formed a button of a whitish-brown colour, something spongy, which with a few strokes of a hammer extended itself easily, but on continuing them it split in pieces. This button weighed 142 grains.

With copper it gave a button of a copperish red, which approached to a dark brown, was spongy, and pretty ductile, and weighed 133 grains. With crude or cast iron, of a white quality, it gave a perfect button, the fracture of which was compact and of a whitish brown colour: it was hard, harsh, and weighed 137 grains; and with lead it formed a button of a dull dark brown, with very little lustre, spongy, very ductile, and splitting into leaves when hammered: it weighed 127 grains.

The button formed with tin was of a lighter brown than the last, very spongy, somewhat ductile, and weighed 138 grains.

That with antimony was of a dark-brown colour, shining, something spongy, harsh, and broke in pieces easily: it weighed 108 grains.

That of bismuth presented a fracture, which, when seen in one light, was of a dark-brown colour, with the lustre of a metal, and in another appeared like earth, without any lustre; but in both cases an infinity of little holes could be distinguished over the whole mass. This button was pretty hard, harsh, and weighed 68 grains.

With manganese it gave a button of a dark-bluish-brown colour and earthy aspect; and on examining the internal part of it with a lens, it resembled impure dross of iron; it weighed 107 grains.

Tungstic acid. The substance called tungstic acid by Scheele and Bergman was discovered by Scheele in 1781. This philosopher obtained it from the tungstat of lime, by treating it with nitric acid and ammonia alternately. The acid dissolves the lime, and the ammonia combines with the tungstic acid. The ammoniacal solution, when saturated with nitric or muriatic acids, deposits a white powder, which is the tungstic acid of Scheele.

This powder has an acid taste, it reddens vegetable blues, and is soluble in 20 parts of boiling water. The Elhuyars have demonstrated that this pretended acid is a compound of yellow oxyd of tungsten, the alkali employed to dissolve it, and the acid used to precipitate it. Thus, when prepared according to the above-described process, it is a compound of yellow oxyd, ammonia, and nitric acid. Their conclusions have been more lately confirmed by the experiments of Vauquelin and Hecht. This substance must therefore be erased from the class of acids, and placed among the salts.

The real acid of tungsten is a yellow powder; the method of procuring which, and its properties, have been already described under the denomination of yellow oxyd of tungsten. It ought rather, as Vauquelin and Hecht have properly remarked, to be classed among the oxyds than the acids; for it is insoluble in water, tasteless, and has no effect on vegetable blues. It agrees with the acids, indeed, in the property of combining with alkalies and earths, and perhaps also with some metallic oxyds, and forming with them salts which have been denominated tungstats; but several other metallic oxyds, those of lead, silver, and gold, for instance, possess the same property. These oxyds, therefore, may be called acids with as much propriety as the yellow oxyd of tungsten.

The affinities of this oxyd, as far as they have been ascertained, are as follows:

Lime,
Barytes,
Strontian,
Magnesia,
Potass,
Soda,
Ammonia,
Glucina,
Alumina,
Zirconia.

The manner in which it was produced is evident: tungstic acid is composed of oxygen and tungsten; the oxygen combined with the carbon, and left the metal in a state of purity.

Tungsten, either in its regulus or compounds, has hitherto been found but of little service in any branch of arts or manufactures. In its reguline state it has hitherto been found to consist of a congeries of roundish grains, or metallic globules, of about the size of a pin's head, with a very brilliant metallic lustre.

In its compounds it has sometimes been employed as a mordant. The triple acidulous tungstat, when digested, according to Morveau, with the red juices of fruits, and with infusions of turmeric and tournesol, forms with them coloured lakes of remarkable fixity, and hence may be of considerable use in the arts. These experiments, however, on repetition in this country, have not been attended with the success that would naturally be expected from M. Morveau's representation.

TUNJA, a town of New Granada, capital of a district of the same name. Near it are mines of gold and emeralds. It is seated in a fertile valley, 90 miles N. by E. of St. Fé de Bogota. Lon. 73. 8 W. Lat. 5. 20 N.

TUNIC. (*tunica, a tuendo corpore*, because it defends the body.) A membrane or covering, as the coats of the eye, &c.

TUNICA, a kind of waistcoat or under garment worn by the ancients, both at Rome and in the East.

The common people ordinarily wore only a tunica; but those of better fashion wore a toga or gown over it. The philosophers wore a gown without a tunica, as professing to go half naked.

The tunica was peculiar to the men; the under-garment of the women not being called tunica, but stola.

The senators wore their tunica enriched with several little pieces of purple, cut in form of large nails; whence it was called laticlavia. The knights had less nails on their tunica, which was hence called angusticlavia: the common people wore their tunica without any clavi at all. And it was by these three different sorts of tunicas that the three different orders of the Roman people were distinguished in habit.

It has been a common opinion, that the angusticlavia distinguished the knights from the common people in the same manner as the laticlavia did the senators from those of the equestrian rank. But Rubenius avers, that there was no manner of difference between the tunics of the knights and those of the commons. As to the persons who had the honour of wearing the laticlavia, it may be maintained, says Kennet (Ant. of Rome, p. 308), that the sons of those senators who were patricians had the privilege of using this vest in their childhood, together with the prætexta. But the sons of such senators as were not patricians did not put on the laticlavia till they applied themselves to the service of the commonwealth, and to bearing of offices. Yet Augustus changed this custom, and gave the sons of any senators leave to assume the laticlavia presently after the time of their putting on the toga virilis, though they were not yet capable of honours. And by the particular favour of the emperors, the same privilege was allowed to the more splendid families of the knights.

TUNICA. (*tunica, a tuendo corpore*, because it defends the body.) See TUNIC.

TUNICA ALBUGINEA OCULI, in anatomy. See CONJUNCTIVE MEMBRANE.

TUNICA ALBUGINEA TESTIS. See ALBUGINEA TESTIS.

TUNICA ARACHNOIDEA. See ARACHNOID MEMBRANE.

TUNICA CHOROIDEA. See CHOROID MEMBRANE.

TUNICA CONJUNCTIVA. See CONJUNCTIVE MEMBRANE.

TUNICA CORNEA. See CORNEA.

TUNICA RETINA. See RETINA.

TUNICA VAGINALIS TESTIS. A continuation of the peritonæum through the inguinal ring, which loosely invests the testicle and spermatic cord.

TUNICATED or COATED BULB, in botany. Tunicatus bulbus. Tunicus numerosis constans. Composed of numerous concentric coats, as the onion. Tunicatus caulis. A tunicated stem. Membranis vestitus. Clothed with membranes.

TUNIS, a country of Barbary, bounded on the N. and E. by the Mediterranean, S. by Tripoli and Biledulgerid, and W. by Algiers. It extends 200 miles from N. to S. and 120 from E. to W. This country was formerly a monarchy, but in 1574 it became a republic, under the protection of the Turks, and pays a certain tribute to the bashaw that resides at Tunis. The soil in the E. part is but indifferent, for want of water. Toward the middle the mountains and valleys abound in fruits; but the W. part is the most fertile, being watered by rivers. The environs of Tunis are very dry, and corn is generally dear; but there are plenty of citrons, lemons, oranges, dates, grapes, and other fruits; also olive trees, roses, and odoriferous plants. In the woods and mountains are lions, bisons, ostriches, monkeys, roebucks, hares, pheasants, partridges, and other sorts of birds and beasts. The principal rivers are the Guadilcarbar, Magrida, Magerada, and Caps. The form of government is by a divan or council, whose president is the bey. The members of the divan are chosen by the bey. The inhabitants are a mixture of

Moors, Turks, Arabs, Jews, and Christians, merchants and slaves; and they carry on a great trade in linen and woollen cloth, Morocco leather, gold dust, lead, horses, oil, soap, and ostriches eggs and feathers. The established religion is Mahometanism. All public instruments are written in the Arabic tongue, but commerce is usually carried on by that of the Linqua Franca.

Tunis, a city and the capital of the country of the same name. It stands on a point of the gulf Goletta, surrounded by lakes and marshes. It is in the form of an oblong square, five miles in circumference, with a lofty wall, five gates, and 35 mosques. The houses are all built of stone, though but one story high; and it has a citadel on an eminence, on the W. side of the city. Without the walls are two suburbs, which contain 100 houses. Within the walls are 10,700 families, and above 3000 tradesmen's shops. The divan, or council of state, assembles in an old palace, and the dey is the chief of the republic, who resides here. The city has no water, but what is kept in cisterns, except one well, kept for the bashaw's use. The harbour has a very narrow entrance, through a small channel, which is well fortified. The Mahometans here have nine colleges for students, beside a great number of smaller schools. Tunis is a place of great trade, 10 miles from the sea, 275 N.W. of Tripoli, and 380 E. of Algiers. Lon. 10. 16 E. Lat. 36. 42 N.

TUNKERS. See Dunkers.

TU'NNAGE. *s.* (from *tun.*) 1. Content of a vessel measured by the tun (*Arbuthnot*). 2. Tax laid by the tun: as, *to levy* tunnage *and poundage*.

TU'NNEL. *s.* 1. The shaft of a chimney; the passage for the smoke (*Wotton*). 2. A funnel; a pipe by which liquor is poured into vessels (*Bacon*). 3. A net wide at the mouth, and ending in a point.

To Tu'nnel. *v. a.* (from the noun.) 1. To form like a tunnel (*Derham*). 2. To catch in a net.

Tunnel-net is a net for the taking of partridges by night, and in use with poachers only, for this purpose. This net is never less than 15 feet in length, and about 20 inches deep, and is made with two wings; so that when they are extended, and fixed to the ground by the stakes prepared for the business, the net forms an angle with the tunnel or flue in the middle. The covey of birds having been watched at the time of calling together in the evening, and known to be in the field, when the proper hour arrives (which is seldom before eleven or twelve at night), the net being previously and properly adjusted, a horse is employed in the process, led in hand by the principal of the firm, who has so nice an ear to the chuckle of the partridges in running, that he is very seldom foiled in his intent of securing the whole in his net; and it is by this wholesale mode of destruction that even the most plentiful districts are sometimes suddenly cleared.

TUNNY, in ichthyology. See Scomber.

TUNSTALL (James), a learned divine, was born about 1710, and educated at St. John's college, Cambridge; he became rector of Sturmer, in Essex, in 1739, and in 1741 was elected public orator of the university; he obtained other valuable livings, and died in 1772. His writings were various, the last of which, Academica, containing Discourses upon Natural and Revealed Religion, he did not live to finish; it was published after his death.

TUNSTATS. (*tunstas.*) Salts formed by the combination of the tungstic acid with different bases, as tunstat of ammonia.

TUP. *s.* A ram. This word is yet used in several provinces.

To Tup. *v. n.* To butt like a ram.

TUPELO TREE. See Nissa.

TURBAN, the head-dress of most of the eastern nations. It consists of two parts, a cap and sash of fine linen or taffety, artfully wound in divers plaits about the cap. The cap has no brim, is pretty flat, though roundish at top, and quilted with cotton; but does not cover the ears. There is a good deal of art in giving the turban a fine air; and the making of them is a particular trade. The sash of the Turk's turban is white linen; that of the Persian's red woollen. These are the distinguishing marks of their different religions. Sophi, king of Persia, being of the sect of Ali, was the first who assumed the red colour, to distinguish himself from the Turks, who are of the sect of Omar, and whom the Persians esteem heretics.

TU'RBANED. *a.* (from *turban.*) Wearing a turban (*Shakspeare*).

TU'RBARY. *s.* (*turbaria*, low Latin.) The right of digging turf (*Skinner*).

TURBETH MINERAL. See Hydrargyrus vitriolatus.

Turbeth root. See Turpethum.

TU'RBID. *a.* (*turbidus*, Latin.) Thick; muddy; not clear (*Philips*).

TU'RBIDNESS. *s.* (from *turbid.*) Muddiness; thickness.

TU'RBINATED. *a.* (*turbinatus*, Latin.) 1. Twisted; spiral; passing from narrower to wider (*Bentley*). 2. Among botanists, plants are called turbinated, as some parts of them resemble, or are of a conical figure.

Turbinated bones. (*ossa turbinata*, from *turbino*, to sharpen at the top, shaped like a sugar-loaf.) The superior spongy portion of the ethmoid bone, and the inferior spongy bones, are so called by some writers.

TURBINA'TION. *s.* (from *turbinated.*) The act of spinning like a top.

TURBIT, in ornithology. See Columba.

TURBITH. See Turbeth.

TURBO. Wreath. In zoology, a genus of the class vermes, order testacea. Animal a limax; shell univalve, spiral, solid; aperture contracted, orbicular, entire. A hundred and fifty species, scattered over the globe; mostly marine; some inhabiting stagnant waters; and some terrestrial: many microscopic. They are thus subdivided.

A. Pillar-margin of the aperture dilated, imperforate.

B. Solid, imperforate.

C. Solid, perforated.

D. Cancellate.

E. Tapering.

A specimen or two is all we can allot.

1. T. littoreus. Perriwinkle. Shell subovate, acute, striate. Inhabits our own and most European shores, and is said by sailors to indicate stormy weather, if seen in great numbers crawling up the rocks, and calm weather when they descend. The fish is often eaten; and the shell too well known to need a minute description.

2. T. crenellus. Shell with a flattish spreading navel; whorls round, with crenate striæ. Size that of a lupine.

3. T. scalaris. Wentle-trap. Shell conic, with distant longitudinally ribbed whorls. Sometimes perforated, with eight whorls; sometimes imperforate with ten. The first inhabits Barbary; the second Coromandel. Two inches long; highly curious and very valuable.

4. T. clathrus. False wentle-trap. Shell taper, not umbilicate; spire with longitudinal ribs; the whorls smooth, ventricose, and separated by a deep canal. Inhabits European and Indian seas, and found on our own coasts: from one to two inches long.

TURBOT, in ichthyology. See PLEURONECTES.

TU′RBULENCE. TU′RBULENCY. *s.* (*turbulence*, French; *turbulentia*, Latin.) 1. Tumult; confusion (*Milton*). 2. Disorder of passions (*Dryden*). 3. Tumultuousness; tendency to confusion (*Swift*).

TU′RBULENT. *a.* (*turbulentus*, Latin.) 1. Raising agitation; producing commotion (*Milton*). 2. Exposed to commotion; liable to agitation (*Milton*). 3. Tumultuous; violent (*Bentley*).

TU′RBULENTLY. *ad.* (from *turbulent*.) Tumultuously; violently.

TURCKHEIM, a town of France, in the department of Upper Rhine, remarkable for a victory gained here by Turenne, over the Austrians, in 1675. It is seated near the river Colmar, one mile N.W. of Colmar.

TURCOISE. See TURQUOISE.

TURCOMANIA, a province of Turkey in Asia, now called Armenia.

TURCOMANS, TEREKEMENS, or TRUKHMENIANS, a people of Asia, who speak the Turkish dialect of the Tartar language, and inhabit the eastern slope of mount Caucasus, the coast of the Caspian about Boinak, Derbent, and Utemish, and the southern promontories between the sea and the river Alazan. Some of them are subject to the khan of Cuba; others to a chief who resides at Nukhu; and a third to the sovereign of Georgia.

TURD. *s.* (ꞇuꞃꝺ, Saxon.) Excrement.

TURDUS. Thrush. In zoology, a genus of the class aves, order passeres. Bill straightish; the upper mandible a little bending, and notched near the point; nostrils naked or half-covered with a small membrane; mouth ciliate, with a few bristles at the corners; tongue jagged. A hundred and thirty-six species, scattered over the globe; seven inhabitants of our own country.

Under this numerous tribe are comprehended the missel, the fieldfare, the throstle, or mavis, as it is called by old writers, the redwing, the blackbird, the ring and water ouzel; together with a vast crowd of foreign birds. The French term the birds of this genus, that have speckled and variegated plumage, grives; and those of a more uniform hue, merles. In the thrush tribes the male and female are pretty nearly of the same size: they are generally subject to a variation of colour, in different seasons of the year. The outer toe is connected with the middle by a membrane, as far as the first joint: their bill is denticulated towards the point, and none of them feed upon grain, which is probably too hard for their stomachs to digest. They are properly baccivorous; but to this food they add insects and worms; hence they are frequently seen scratching the ground, especially after rain, when these animals come to the surface.

Among the Romans some species of the thrush were deemed exquisite food; whence Martial:

> " Inter aves turdus, inter quadrupedes gloria
> prima, lepus;"

and, to procure a supply of it, no labour or expence was spared by that sensual and luxurious people. They constructed large aviaries, fit for the reception of many thousands of these devoted creatures, along with equal numbers of quails, ortalans, and other birds reckoned delicate eating. Such vast numbers of these aviaries were erected in the vicinity of Rome, that their dung was employed as a manure for the fields, like that of the dovehouses with us.

In these aviaries, however, the Roman birds enjoyed not the same liberty with our dovehouse pigeons; for they were never allowed to escape, and, by consequence, they seldom laid, or produced young. As, however, they were provided with abundance of well-chosen food, they readily fattened, to the great profit of the proprietor. Their ordinary price was about two shillings a-piece; but, about the time of a public triumph, or any grand festival, they far exceeded that sum. These aviaries were large vaulted buildings, supplied with a number of joists, upon which the birds might perch. They were but obscurely lighted, so that the prisoners might never see the fields, the woods, or the wild birds fluttering at their liberty; images which could not fail to excite a regret for their lost freedom, and to prevent them from fattening. Slaves, says Buffon, should never see too clearly; and they took care that these should only be able to distinguish the different objects that were to supply their wants. They were fed with millet and a sort of paste made up of bruised figs and meal; to these were added ivy and myrtle berries, and every thing that could give a relish and succulency to their flesh. They got water from a small stream that ran across the aviary. For about twenty days before they were killed for eating, their quantity of food was increased, and care taken that it should be of a more nutritive quality. So far was attention to this business carried, that the owners made those that were fat, and ready for being taken, pass gently into a small chamber adjoining the aviary, where they cut off all communication between them and those that were left, that the latter might not be disturbed by catching the former. With the latter they tried every method to keep up the illusion of liberty. From time to time they lined the walls of the aviary with green branches and leaves, that the birds might still fancy themselves in the midst of the grove. Thus they were accustomed, by degrees, to captivity; they were slaves kindly treated by their master, because he understood his own interest. This account of Roman epicurism is attested both by Columella and Varro; and, from their relations, Buffon has compiled a very curious history of the ancient aviaries of the Romans.

An improvement upon this practice of the Romans is said to be invented in modern times, and applied to practice in some provinces of France, where the inhabitants fasten earthen pots among the branches of trees, which the thrushes frequent. In these the birds find a convenient shelter from the weather without losing their liberty; and hence they seldom fail to prefer them to nests of their own construction. Partly from the security afforded to the young in these pots, and partly from the great saving of labour to the parent birds, who are thus enabled to bring up two families every year, thrushes have been found to multiply greatly under this mode of treatment. When the birds are not thus aided by the art of man, their nests are finished with great difficulty and labour. Outwardly they are constructed of moss, straw, and dried leaves; and in the inside they are overlaid with a thick plaister of baked clay and hair. Some kinds are not even satisfied with this, but garnish the inside still farther with feathers of various kinds.

Thrushes are in general grave and melancholy. Their innate love of liberty is not easily overcome by domestication. Seldom are they seen to fight, sport, or play with each other, in their natural state, and far less in a state of captivity, which they never relish. Some of these birds, however, become excellent songsters by education; and the throstle has, in several instances, added to the talent for music that of speech. Such, at least, is the account given by Pliny of a thrush tamed by the empress Agrippina.

The following species chiefly offer themselves to our notice.

1. T. viscivorus. Missel, or misselbird. Back brown; neck spotted with white; bill yellowish. Eleven inches long; builds in bushes or on the side of some tree; and lays four or five eggs. Sings finely in the spring, sitting on the summit of a tree. The missel is peculiarly distinguished as being the largest British bird that has any harmony in its voice. All that are of superior size having a screaming or croaking note; whence they are properly introduced by Thomson into the concert of the grove, as if to supply a kind of bass or chorus to the smaller warblers. Even the missel discovers its affinity to the superior tribes by the harsh screaming sound it utters, when moved by anger or fear. It feeds upon holly and misseltoe-berries, and insects, and may be regarded as sovereign of the grove; for it drives away from the coppice all the inferior species of the thrush kind.

2. T. musicus. Song thrush. Throstle. Quill-feathers ferruginous at the inner base. Inhabits the woods of Europe; nine inches long; builds in a low bush a nest of earth, moss, and straw, plaistered with clay within: lays five or six pale blueish eggs with dusky spots. In France this bird is migratory; but remains in England during the whole year. It arrives in France commonly about the time of the vintage, when it frequently intoxicates itself with the juice of the ripe grape; a circumstance from which it has, in France, obtained also the name of the vine-thrush. This bird is remarkably prolific, producing, in some countries, no less than three different families in one season. Of all the thrush kind it is the most accomplished singer; and feeling frequent returns of the amorous passion, which is the source of all the harmony of the grove, it is said to sing during three quarters of the year. When it begins to warble it perches upon a high branch of one of the tallest trees, from which it pours forth its melody for hours together. Its song is a compound of several notes, which it has skill artfully to combine. From this superior compass and modulation of voice, it has, in many countries, as well as in our own, obtained a name indicative of its musical powers.

This species of thrush is very widely diffused over Europe. It is frequent in Scotland, England, France, Germany, and Sweden. Although timid, and apparently possessed of cunning, yet it does not avoid the snares that are laid for it. There are some districts in Poland where such numbers are caught that they are exported to other countries. The quality of the flesh of this, as of all kinds of birds, depends greatly on the food upon which it subsists. At one season, therefore, it may be palatable, and intolerable at another. It seems to be no where in such request at present as it was among the ancient Romans. There are several varieties of the song thrush in Europe, three or four in America.

3. T. pilaris. Fieldfare. Tail-feathers black, the outermost at the inner edge tipped with white; head and rump hoary. There are three or four other varieties; as spotted with black; the head, neck, and body beneath, white; head and neck white, body as in the first, or white with large blackish spots. The

bill is yellow; and the legs of a deep brown. This species forms a part of that unfortunate race of warblers which are the annual victims of the birdcatching art. They visit this country about Michaelmas, and leave it about March; and the birdcatchers attempt to take them during their passage. They live upon the fruit of the hawthorn, and almost every species of berry, during the winter, when they are seen in flocks, sometimes of a thousand, on the same field.

They are more easily tamed than the other thrushes, but reward not, with their song, the labour bestowed on their education. Linnéus mentions an instance of one that was tamed in the house of a wine-merchant, that became so familiar as to drink wine out of the glasses upon the table. The effects of this liquor made it throw its feathers, which were renewed, after it had been confined for a while in the cage, and had been obliged to lead a more temperate life.

The numbers, as well as the appearance, of these birds in this country, seem to be determined by the rigour of the season; and they are said to have a presentiment of its cessation; whence, as long as they are in the field, the inhabitants of the country conclude that the severity of the winter is not past. Their summer residence is Syria, Siberia, or the neighbouring districts, where they feed upon juniper-berries; whence their flesh contracts a bitterness, which some have thought agreeable. The young of the missel, when put into the nest of the fieldfare, are adopted by the female, and reared with the same care as her own; from which it has been rashly concluded that a mixed race might be procured by the union of these two species. No such breed, however, has ever been obtained, though many families of the former have been reared by the maternal cares of the latter.

4. T. merula. Blackbird. Black-ouzel. Black; bill and eye-lids yellow. Three other varieties; one, the head white; another, body white; a third, variegated black and white. Inhabits Europe and Asia; frequents hedges and thickets, and lays four or five blueish-green spotted eggs. The blackbird has often been tamed, on account of its song. Its voice, however, is too loud and harsh for any place but the woods. It is said, indeed, to be capable of great improvement, from a faculty which it possesses of imitating the sounds of any musical instrument. Some, that have been well educated, sing part of an air very justly. We have not, however, witnessed any instance of their being able to retain a tune of any length or variety of notes.

In their manners these birds differ considerably from the song-thrush: they neither travel, nor associate together in flocks; but, though more shy towards each other, they are less so with regard to man. They are easily tamed by him, and reside, from choice, near his habitation. Endowed with a piercing eye, and accustomed to be continually on the watch against an enemy so near, they have acquired great credit for their cunning. On experience, however, they have been found more restless than artful, rather timid than distrustful; for there is hardly any kind of snare in which they may not be taken, provided the hand that lays it can render itself invisible.

When the blackbird is enclosed in the same cage with other songsters of inferior size, his restless habits are changed into an overbearing petulance: he incessantly pursues and torments his fellow-prisoners. He should never, therefore, be placed in the same apartment with smaller birds, nor allowed to enter a company to which his behaviour is so rude.

It has been asserted by the ancient naturalists, that the blackbird never moults, because he is heard to sing during winter, a period when the other birds are silent. Nature, however, seldom acknowledges any race of privileged beings which she exempts from her general laws. The more accurate observation of the moderns has discovered the moulting season of this bird, which is at the end of summer. Then they are seen, along with their young, sometimes almost half naked.

In the spring they procreate very early. The nest is made of moss, grass, &c. lined with clay, and covered over afterwards with hay. They feed upon fruit and insects of every kind.

5. T. torquatus. Ring-ouzel. Blackish; bill yellowish; collar white. There are one or two other varieties from diversity of colour, which are called water-ouzel and rock-ouzel. The French name merle is applied to all three. The middle of the breast of the ring-ouzel is beautifully ornamented with its crescent of pure white; the horns pointing to the hind part of the neck. The water-ouzel is the most retired of this solitary tribe: it is commonly seen single, hopping by small brooks or steep banks. It lives upon insects and small fishes; and, though unprovided with webbed feet, will dive in pursuit of them. But the most beautiful of this tribe is the carnation or rose-coloured ouzel, which, Linnéus informs us, is an inhabitant of Lapland and Switzerland. One or two of these birds have been seen in Britain, where they were supposed to have strayed in their migrations from Lapland to the south of Europe. The breast, belly, back, and coverts of the wings, of this beautiful species, are of the colour of a rose of two tints, of which the one is pale and the other deeper. The head, neck, wings, and tail, shine with different reflections of purple and green. The ouzel inhabits Europe, Asia, and Africa; is eleven inches long, migrates in flocks, and feeds on insects and berries.

6. T. polyglottus. Mocking-bird. Mimic thrush. Dusky ash, beneath pale ash; primary quill-feathers white on the outer half. Nine inches and a half long; feeds on berries, fruits, and insects. This bird forms a striking exception to the general character which naturalists have given of the birds of the new world. It is allowed by all travellers that the rich, lively, and brilliant hues of the feathered race, in that continent, are strongly counter-

balanced by their harsh, monstrous, and disagreeable notes. The mocking-bird, however, is represented as the most melodious of all birds, the nightingale itself not excepted. To the charms of its natural song it adds the wonderful faculty of counterfeiting the notes of every bird in the woods. Far from ridiculing the songs which he repeats, he seems only to imitate in order to improve them, and to perfect and increase his own powers by exercising them in every possible manner. The mocking-bird not only sings with taste but with action and vivacity: he accompanies every note, whether natural or acquired, with corresponding gestures of the body. If the air he warbles be brisk and lively, he beats time by the rapid and fluttering motions of his wings. If his voice, from a loud and full tone, die away by gentle cadences, into a perfect silence, more charming than melody itself, he is skimming, at the same time, above his tree, gradually lessening the undulations of his wings, till at last he seems to rest suspended and motionless on the bosom of the air.

With all these qualifications that endear him to man, the mocking-bird is of a very ordinary appearance compared with the other tenants of the American woods. The upper parts of the body are of a brownish-grey; and the breast and belly white. Under this plain appearance, which has neither lustre nor variety of colours, he amuses or deceives every animal in the forest.

He seems to sport with the hopes and fears of the small birds; at one time alluring them by the call of their males, and then terrifying them, after their approach, with the screams of the eagle or other birds of prey. As there is no bird which it cannot imitate, so there is none that it has not at times deceived by its call. It is found in Carolina, Jamaica, New Spain, and, in general, inhabits most of the warm or temperate climates of America. It is fond of the vicinity of man, and is easily domesticated. It perches on the trees around the planter's houses, and sometimes upon the chimney tops, where it remains all night, pouring forth the sweetest and most various notes of any of the feathered tribes.

7. T. curæus. Glossy black; bill substriate; tail wedged. Inhabits Chili: size of the missel; sings finely, and imitates the notes of other birds; and, when tamed, the voice of man: feeds on worms and seeds, and on smaller birds, which it kills by perforating the skull with its bill; lays three bluish-white eggs. Tail five inches long.

8. T. tinniens. Alarum thrush. Above brown, beneath white; breast spotted with black; tail even. Inhabits Cayenne; six and a half inches long; and cries every morning and evening, for the space of an hour, with a harsh loud voice like an alarum bell.

9. T. arundinaceus. Reed thrush. Rusty-brown, beneath white-testaceous; quill-feathers brown tipt with reddish. Three other varieties from diversity of colours. Inhabits reedy marshes of Europe; builds a hanging nest among the reeds, and lays five or six yellowish-white eggs, spotted with brown; the male sings while the hen is sitting: seven inches long.

TURENNE, a town of France, in the department of Correze, with a castle, 42 miles S. of Limoges. Lon. 1. 30 E. Lat. 45. 9 N.

Turenne (Henry de la Tour d'Auvergne, Viscount de), second son of the duc de Bouillon, and Elizabeth of Nassau, daughter of William I. of Nassau, prince of Orange, was born at Sedan, in 1611; he learned the art of war under prince Maurice, his maternal uncle, and became one of the most illustrious generals France ever possessed. He has been compared to Scipio, for his liberal behaviour to a handsome lady, taken prisoner in the siege of Solre-le-Chateau, in the country of Hainault, who being brought into his presence, he gallantly delivered safe to her husband. Those, however, who cherish more of humanity than of esteem for the exploits of war must lament the horrible excesses he committed through a large extent of fruitful country in Germany, giving it up to fire and sword. At last Montecuculi was opposed to him, and these two generals were on the point of committing their reputation to the fate of a battle near the village of Soltzbach, when Turenne, while reconnoitring, received a cannon-ball in his body, on the 27th July, 1675.

TURF. *s.* (ꞇẏꞃꝼ, Saxon; *torf*, Dutch.) A clod covered with grass; a part of the surface of the ground (*Addison*).

To Turf. *v. a.* (from the noun.) To cover with turfs (*Mortimer*).

Turf, in a sporting sense, is intended to imply whatever appertains to horse-racing, custom having established three concise terms by which the distinct sports may be fully comprehended. The sod is expressive of cocking; the field, of hunting; and the turf, of racing. See Horse-racing.

TURFA. Turf. Peat. In mineralogy, a genus of the class inflammables. Generally of a dull colour, and more or less of a fibrous texture; when burnt emitting fumes which are exceedingly offensive to the smell and eyes; consisting of the fibrous roots and other parts of vegetables, more or less intermixed and combined with bitumen. Five species.

1. T. cæspitosa. Common turf. Whitish, light, easily and speedily burning into ashes with flame, and a small degree of fumes: sometimes consisting principally of heath, sometimes of mosses and grasses. Found commonly on moors and heaths, covering the surface of the ground, or covered with a light stratum of the soil only; and is generally in deeper layers than others of its kind; pale hoary, or when contaminated with iron, octraceous. It is so light that a piece fourteen inches long, six broad, and four thick, will weigh only from thirteen to fifteen ounces; its vapour is not disagreeable to the nose and eyes, as that of several other species, but it consumes very quick, gives but little heat, and leaves a very large quantity of ashes.

2. T. foliata. Of a texture approaching to the lamellar. Found in bogs and spongy places, collected into small hillocks, and consists of numerous unequal layers, which are separable like the leaves of a book: the vegetables of which it is composed are in a rather more decayed state than those of the last.

3. T. maritima. Dunny. Burning slowly, and emitting most offensive fumes to the nose and eyes. Found in low maritime situations, and in the neighbourhood of salt springs; rather ponderous; of a darkish colour; and takes a longer time in consuming than common turf, but gives out much more heat.

4. T. palustris. Peat. Of a dark colour, consolidating in the air, burning quicker and with less offensive fumes. Found every where in bogs and morasses, and is generally the middle and lower beds under turf, and frequently at the bottom of bogs where the water has lain stagnant; the vegetable substances are in quite a decayed state, and therefore less visible; a brick of fourteen inches long, six broad, and four thick, will weigh from a pound and a quarter to a pound and three quarters: it is in many places a principal article of fuel, and its ashes are of considerable value as a manure.

5. T. picea. Solid turf. Of a dark colour, consolidating in the air, a little greasy to the touch, impregnated with a large proportion of bitumen, and burning with much heat and fumes. Found on plains at the top of high mountains, frequently on those composed of granite, and at the bottom of stagnant waters; after being some time kept it will burn like coal; the most ponderous of its kind; a brick fourteen inches long, six broad, and four thick, weighing above two pounds.

TU′RFINESS. *s.* (from *turf.*) The state of abounding with turfs.

TU′RFY. *a.* (from *turf.*) Full of turfs.

TU′RGENT. *a.* (*turgens*, Latin.) Swelling; protuberant; tumid (*Thomson*).

TURGE′SCENCE. Turge′scency. *s.* (*turgescens*, Latin.) 1. The act of swelling; the state of being swollen (*Brown*). 2. Empty magnificence.

TU′RGID. *a.* (*turgidus*, Latin.) 1. Swelling; bloated; filling more room than before (*Philips*). 2. Pompous; tumid; fastuous; vainly magnificent (*Watts*).

TURGI′DITY. *s.* (from *turgid.*) State of being swollen (*Arbuthnot*).

TURGOT (Michael Stephen), president of the parliament at Paris, contributed to adorn Paris, and to promote the comforts of its inhabitants. He died 1751, aged 52.

Turgot (Anne Robert James), youngest son of the preceding, was born 1727. He studied divinity at the Sorbonne, and at the age of 24 he began a translation of the Georgics of Virgil. His abilities recommended him to the court, and for 12 years he was intendant of Limoges, where he promoted commerce, and opened sources of opulence by the making of new roads, and digging of canals. Called by Lewis XVI. to the office of comptroller-general of the finances, he improved the resources of the kingdom, and lessened the burdens of the people. His plans were grand, liberal, and useful; but unfortunately he was opposed by those who were possessed of power rather than of an enlightened mind, and he at last retired from a situation which he had adorned by his talents and integrity. His ministry was indeed short, but very popular and useful. He died of the gout, 1781, aged 49. Memoirs of his life and of his works were published by Condorcet, 8vo.

TURILITE, in mineralogy, a name given to a species of basalt or porphyry, but which is more generally called Rowley-rag. See Basaltes and Porphyrius.

TURIN, a flourishing city of Italy, the capital of Piedmont, and residence of its sovereign, the king of Sardinia, with an archbishop's see, and a university. It is seated on a vast plain, at the foot of the Alps, and at the confluence of the Doria and Po. Here are many large squares, among which that of St. Charles is the most spacious and beautiful: the buildings are handsome, and it has extensive arcades on each side. Most of the streets are well built, uniform, straight, and terminate on some agreeable object: the Strada di Po, the finest and largest, leads to the royal palace, and is adorned with piazzas, filled with shops, as are various others of the best streets; all of which are kept clean by means of a canal from the Doria, with sluices that flow through them into the Po. The inhabitants are computed to be 100,000. The royal palace consists of two magnificent structures, joined together by a gallery, in which are several pictures, statues, and antiquities, of great value. The arsenal is a fine and capacious building, including five courts; it contains arms for 120,000 men, and there is a cannon foundry and a chemical larboratory annexed to it. Turin is extremely well fortified, and the citadel is a masterpiece of architecture. There are fine walks on the ramparts and walls of the city; also very fine gardens on the side of the river Po; and a charming public place called the Corfo, where the nobility assemble, from five to six in an evening, to exhibit themselves and their equipage. Near the city, on the banks of the Po, is the beautiful royal castle of Valentin, the garden of which is applied to botanical studies. The French besieged this city in 1706; but prince Eugene attacked them before the walls, totally defeated their army, and compelled them to raise the siege. In December 1798, the French republican army took possession of Turin, seized all the magazines and arsenals of Piedmont, occupied all the strong places, and established a provisionary government, obliging the king and his family to remove to the island of Sardinia. Turin is 60 miles N.E. of Genoa, 65 S.W. of Milan, and 280 N.W. of Rome. Lon. 7. 45 E. Lat. 45. 5 N.

TURINGE, a town of Sweden, in the province of Sudermanland, 24 miles W.S.W.

of Stockholm. Lon. 17. 54 E. Lat. 59. 10 N.

TURIO. (from terio, *quia facile teratur*; as *tugurium*, q. *tegurium* from *tego*, or q. *tenerio* from *tener*.—How Dr. Berkenhout came to derive it from *tyro*, every one must be at a loss to conceive.) This word is used by Columella for the extreme twig or young shoot of a tree. We do not find it in Philos. Bot.—Termini Botanici—or Delin. Pl.—Giseke makes it synonymous with stolo.—Dr. Berkenhout says it is the gemma, so called by Ludwig, when proceeding from the root.—Ray, whose ideas and expressions are ever classical, says: tenella arborum, fruticum aut herbarum cacumina, quasi teneriones; vel, ut Vossius vult, quia facile teruntur.—Leers explains turiones to be—tenellæ plantarum soboles, verno tempore cum foliis e terra erumpentes: ut asparagus, humulus. The tender shoots of plants which come up in the spring; as in the asparagus and hop. Such are called asparagi; the tender sprouts or shoots of any herb from the ground. Ray thus explains the word asparagus:—dicitur primum germen herbarum quod edendo est vel oleris cujusque turio antequam in folia explicatur, a σπειρω.

TURKEY, in ornithology. See MELEAGRIS.

TURKEY, a large empire, extended over part of Europe, Asia, and Africa. Turkey in Europe is bounded on the north by Croatia, Sclavonia, Hungary, Transilvania, and Poland, east by New Russia, the Black sea, the sea of Marmora, and the Archipelago, south by the Mediterranean, and west by that sea and the Venetian and Austrian territories. It contains Moldavia, Bessarbia, Walachia, Bulgaria, Servia, Bosnia, part of Croatia and Dalmatia, Romania, Macedonia, Albania, Janna, Livadia, and the Morea. These countries lie between 17. and 40. E. lon. and 36. and 49. N. lat. Turkey in Asia is bounded on the north by the Black sea and Circassia, east by Persia, south by Arabia, and west by the Mediterranean and the sea of Marmora. It lies between 27. and 46. E. lon. and 28. and 45. N. lat. and contains the countries of Irac-Arabi, Diarbek, Curdistan, Armenia, Caramania, Natolia, and Syria, with Palestine. In Africa, the Turks have Egypt, part of Nubia, and Barca; and the states of Tripoli, Tunis, and Algiers are under their protection. Of these countries (which see respectively) the climate, productions, manners, &c. must be various. The Turks are generally robust, well shaped, and of a good mien. They shave their heads, but wear long beards, except those in the seraglio, or palace, and military men, who wear only whiskers. The turban worn by the men is white, and consists of long pieces of thin linen made up together in several folds. No one but a Turk must presume to wear a white turban. Their clothes are long and full. They sit, eat, and sleep on the floor, on cushions, matrasses, and carpets. In general, they are very moderate in eating, and their meals are dispatched with great haste. Their principal food is rice; and the frugal repast is followed by fruit and cold water, which are succeeded by hot coffee, and pipes with tobacco. With opium they procure what they call a kief, or placid intoxication. Chess and draughts are favourite games; and the coffee-houses and baths furnish other sources of amusement. Polygamy is allowed among them; but their wives, properly so called, are no more than four in number. The fair sex here are kept under a rigorous confinement: the Arabic word haram, which signifies a sacred or prohibited thing, is, in its fullest sense, used both of the habitation of the women, and of the women themselves. The Turks believe in one God, and that his great prophet is Mahomet: they appropriate to themselves the name of Moslemim, which has been corrupted into Musselman, signifying persons professing the doctrine of Mahomet, which he calls islam. Drinking wine is prohibited by this prophet in the Koran, yet the Turks make use of it occasionally, without any scruple; though instead of it they generally use sherbet, a liquor made of honey, spices, and the juice of fruits. They expend great sums on fountains, not only in the towns, but in the country, and other solitary places, for the refreshment of travellers and labourers. They are charitable toward strangers, let their religion be what it will; and no nation suffers adversity with greater patience than they. The grand signior is absolute master of the goods and lives of his subjects, insomuch that they are little better than slaves. The grand vizier is the chief next the emperor; but it is a dangerous place, for he often deposes them, and takes off their heads at his pleasure. Though the grand signior has such prodigious power, he seldom extends it to persons in private life, for these may remain as quiet as in any other part of the world. The nobility among the Turks are the chief military officers, judges, and ecclesiastics. The beglerbegs or viceroys, the bashaws or governors, the sangiacs or deputy-governors, and the officers of state, are, in general, the children of christian parents, who are commonly taken in war, or purchased. The Turks have always very numerous armies on foot, the chief of which are the janisaries, who have been bred in the seraglio, and have used military discipline from their infancy. Of these they have always 25,000, and there may be about 100,000, who have that name. The tributary princes, as the princes of Moldavia and Walachia, are obliged also to send auxiliaries. The whole Turkish army makes above 300,000 men. Their navy, which is laid up at Constantinople, consists of about 40 large ships; but in time of war auxiliary ships are received from Algiers, Tunis, and Tripoli; they also buy up or hire merchants ships, and thus raise a fleet of 150 sail, exclusive of gallies. Constantinople is the capital of all Turkey.

TURKEY STONE. See ARDESIA.

TURKEY-BERRY TREE. See CORDIA.

Turkey wheat. See Zea.

TURK'S CAP. See Lilium.

TURKIN, a town of Russia, in the government of Caucasia, situate on the Caspian sea, 140 miles S. of Astracan. Lon. 47. 15 E. Lat. 44. 15 N.

TURMERIC. See Curcuma longa. The root of this plant, which is cultivated largely in the East Indies, consists of a large oval bulb, from which spring two or three tortuous processes three or four inches long. This root is of a dusky brown externally, and of a deep orange yellow within, of a somewhat fragrant smell, and a bitterish aromatic taste. The yellow colour is extracted easily both by water and alkohol, and is sometimes used in dyeing, but the dye is extremely fugitive, and cannot be fixed on cloth by any known mordant, which is a loss to the dyer, as there is no vegetable substance that gives so rich an orange yellow: when employed in dyeing it is chiefly to give a finishing gloss to the more solid colours, which, however, soon fades. The yellow of turmeric is rendered somewhat paler by acids, but is changed to a brick-red by the alkalies, and alkaline earths; and it is the latter property that renders it of use to the chemist, as its sensibility to alkaline tests is so great as to indicate a smaller quantity of these substances than can be done by any other method, and hence the exact point of saturation may be hit, which is of importance in many experiments. To apply it, either a spirituous tincture or a watery infusion may be used, or more simply, a fresh-cut surface of the entire root may be wetted with distilled water, and by being rubbed on white paper a very visible yellow mark will be made, on which a drop of the liquor to be examined may be dropped down. When the quantity of alkali is very small, it requires a few minutes to produce the full change.

Turmeric is used largely in the East as a condiment to food, and is particularly the substance that gives the colour to curry.

TURMOI'L. *s.* (from *moil*, to labour.) Trouble; disturbance; harassing uneasiness; tumultuous molestation (*Shakspeare*).

To Turmoi'l. *v. a.* (from the noun.) 1. To harass with commotion (*Dryden*). 2. To weary; to keep in unquietness (*Milton*).

To **TURN.** *v. a.* (ꞇuꞃnan, Saxon; *tourner*, French; from *torno*, Latin.) 1. To put into a circular or vertiginous motion; to move round; to revolve (*Milton*). 2. To put the upper side downward; to shift with regard to the sides (*Addison*). 3. To change with respect to position (*Milton*). 4. To change the state of the balance (*Shakspeare*). 5. To bring the inside out (*Milton*). 6. To change, as to the posture of the body, or direction of the look (*Pope*). 7. To form on a lathe by moving round (*Moxon*). 8. To form; to shape (*Tatler*). 9. To change; to transform; to metamorphose; to transmute (*Taylor*). 10. To make of another colour (*Floyer*). 11. To change; to alter (*Shakspeare*). 12. To make a reverse of fortune (*Dryden*). 13. To translate (*Pope*). 14. To change to another opinion, or party, worse or better; to convert; to pervert (*Leviticus*). 15. To change with regard to inclination or temper (*Psalms*). 16. To alter from one effect or purpose to another (*Tillotson*). 17. To betake (*Temple*). 18. To transfer (1 *Chronicles*). 19. To fall upon by some change (*Bacon*). 20. To make to nauseate (*Fell*). 21. To make giddy (*Pope*). 22. To infatuate; to make mad: applied to the head or brain (*Dryden*). 23. To change direction to, or from, any point (*Locke*). 24. To direct by a change to a certain purpose or propension (*Addison*). 25. To double in (*Swift*). 26. To revolve; to agitate in the mind (*Watts*). 27. To bend from a perpendicular edge; to blunt (*Ascham*). 28. To drive by violence; to expel (*Knolles*). 29. To apply by a change of use (*Temple*). 30. To reverse; to repeal (*Deuteronomy*). 31. To keep passing in a course of exchange or traffic (*Collier*). 32. To adapt the mind (*Addison*). 33. To put toward another (*Exodus*). 34. To retort; to throw back (*Atterbury*). 35. *To* Turn *away*. To dismiss from service; to discard (*Arbuthnot*). 36. *To* Turn *away*. To avert (*Duty of Man*). 37. *To* Turn *back*. To turn to the hand from which it was received (*Shakspeare*). 38. *To* Turn *off*. To dimiss contemptuously (*Shakspeare*). 39. *To* Turn *off*. To give over; to resign (*Decay of Piety*). 40. *To* Turn *off*. To deflect (*Addison*). 41. *To be* Turned *of*. To advance to an age beyond (*Addison*). 42. *To* Turn *over*. To transfer (*Sidney*). 43. *To* Turn *over*. To refer (*Dryden*). 44. *To* Turn *over*. To examine one leaf of a book after another (*Swift*). 45. *To* Turn *over*. To throw off the ladder (*Butler*). 46. *To* Turn *to*. To have recourse to (*Grew*).

To Turn. *v. n.* 1. To move round; to have a circular or vertiginous motion (*Ben Jonson*). 2. To show regard or anger, by directing the look toward any thing (*Locke*). 3. To move the body round (*Milton*). 4. To move from its place (*Wiseman*). 5. To change posture (*Cheyne*). 6. To have a tendency or direction (*A. Philips*). 7. To move the face to another quarter (*Dryden*). 8. To depart from the way; to deviate (*Dryden*). 9. To alter; to be changed; to be transformed (*Tay.*). 10. To become by a change (*Boyle*). 11. To change sides (*Swift*). 12. To change the mind, conduct, or determination (*Milton*). 13. To change to acid (*Bacon*). 14. To be brought eventually (*Addison*). 15. To depend on, as the chief point (*Pope*). 16. To grow giddy (*Shakspeare*). 17. To have an unexpected consequence or tendency (*Wake*). 18. *To* Turn *away*. To deviate from a proper course (*Proverbs*). 19. To return; to recoil (*Milton*). 20. To be directed to or from any point: as, *the needle* turns *to the pole*. 21. To change attention or practice (*Milton*). 22. *To* Turn *off*. To divert one's course (*Norris*).

Turn. *s.* (from the verb.) 1. The act of turning; gyration. 2. Meander; winding way (*Dryden*). 3. Winding or flexuous course (*Addison*). 4. A walk to and fro

(*Shakspeare*). 5. Change; vicissitude; alteration (*Hooker*). 6. Successive course (*Bacon*). 7. Manner of proceeding; change from the original intention or first appearance (*Swift*). 8. Chance; hap (*Collier*). 9. Occasion; incidental opportunity (*L'Est.*). 10. Time at which, by successive vicissitudes, any thing is to be had or done (*Denham*). 11. Actions of kindness or malice (*South*). 12. Reigning inclination (*Swift*). 13. A step off the ladder at the gallows (*Butler*). 14. Convenience; use; purpose; exigence (*Clarendon*). 15. The form; cast; shape; manner (*Watts*). 16. The manner of adjusting the words of a sentence (*Addison*). 17. New position of things; as, something troublesome happens at every *turn*. 18. *By* TURNS. One after another; alternately (*Prior*).

TU'RNBENCH. *s.* (*turn* and *bench.*) A small iron lathe (*Moxon*).

TU'RNCOAT. *s.* (*turn* and *coat.*) One who forsakes his party or principles; a renegade (*Shakspeare*).

TURNEP, in botany. See BRASSICA.

TURNEP CABBAGE, in botany. See BRASSICA.

TURNEP RADISH, in botany. See RAPHANUS.

TURNEP FLY. See CHRYSOMELA.

TU'RNER. *s.* (from *turn.*) One whose trade is to turn in a lathe (*Dryden*).

TURNERA, in botany, a genus of the class pentandria, order trigynia. Calyx five-cleft, funnel-form; the exterior one two-leaved; petals five, inserted on the calyx; stigmata many; capsule one-celled, three-valved. Nine species; natives of the West Indies and South America. One is cultivated in our hot-houses, T. ulmifolia, elm-leaved turnera, with a shrubby stem, rising eight or ten feet; leaves ovate-lanceolate; corol large and bright yellow.

TURNHOOF, a vulgar name for ground ivy. See HEDIRA.

TURNHOUT, a town of the Netherlands, in Brabant, near which, in 1596, prince Maurice of Nassau, with only 800 horse, totally defeated the Spaniards, consisting of 6000. It is 24 miles N.E. of Antwerp.

TU'RNING. *s.* (from *turn.*) Flexure; winding meander (*Milton*).

TURNING, in mechanics, a very ingenious and useful art, by which a great variety of articles are manufactured, by cutting or fashioning them while they revolve upon an axis or line, which in most cases remains immoveable. Every solid substance in nature may be submitted to this process, and accordingly we have articles turned in the metals, in wood, in pottery, in stone, in ivory, &c. so numerous, and so universally in use, that it would be superfluous to enumerate or point them out. In the present article we shall describe the art in a general way, sufficient to show its principles, and may be of utility in practice.

The simplest process of turning is that of the potter, who, in the first stage of forming his ware, sticks a piece of humid clay upon a wheel, or flat table, while it revolves horizontally, and in this state of rotation of the clay, he fashions it with the greatest facility into vessels of every description. But in most operations of the art the revolving body is cut or shaved by applying a chisel, or other suitable tool, to its surface, while in motion; a condition that requires firmness in the axis of rotation, and also that the tool itself should be steadily supported. The instrument, or apparatus for these purposes, is called a LATHE. See below. Among the great varieties of lathes, it is indispensably required, for circular turning, that the work should be supported by two steady centres, or by parts equivalent to two centres, at a distance from each other in the axis of rotation, and that the tool should be supported by a steady bar, or piece called the rest. The mechanism for causing the rotation is described in the article succeeding this.

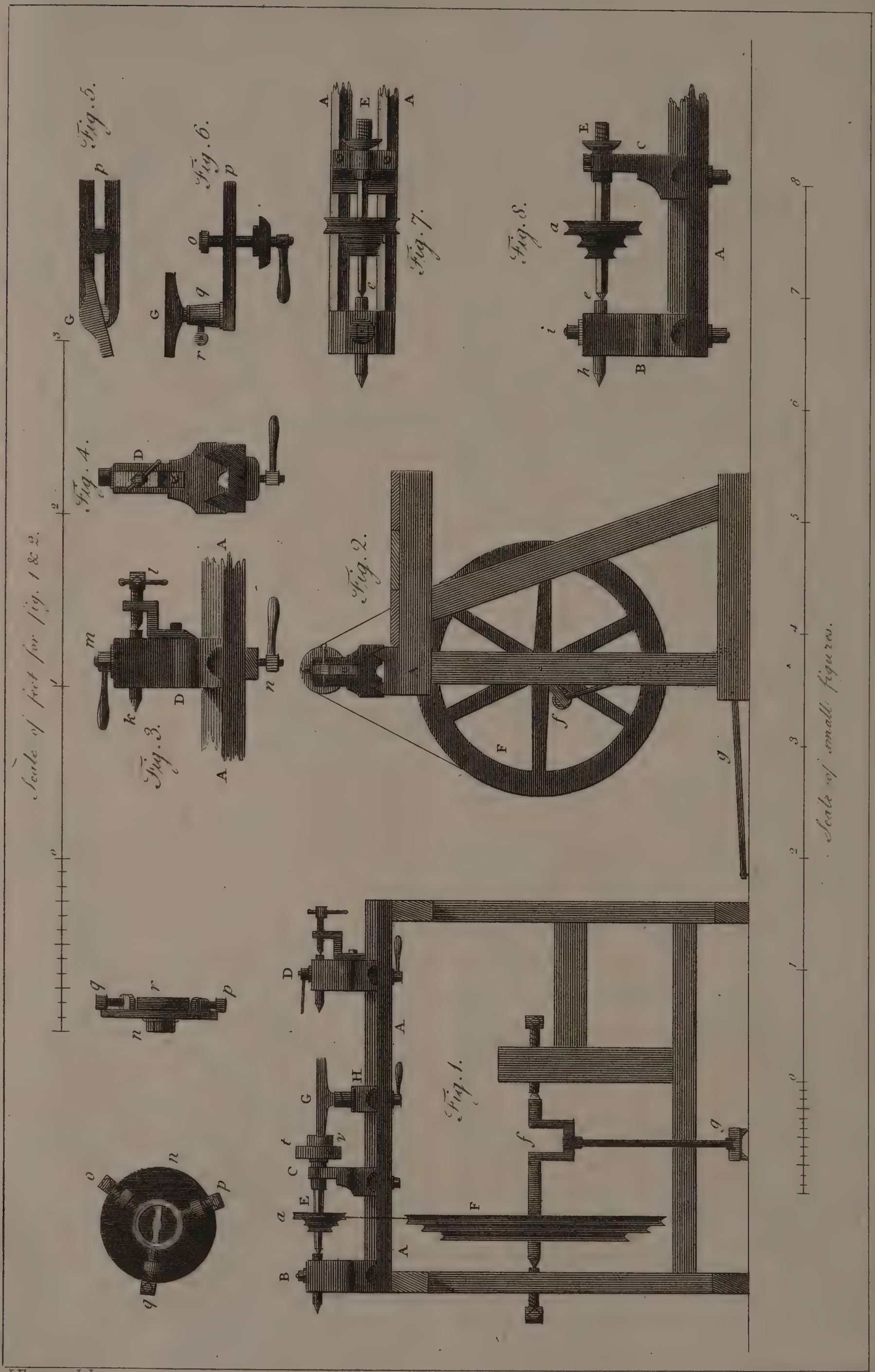
A great number of turned articles either have, or will admit of, a perforation through their axes. All wheel-work, and most of the articles turned in wood, are of this description. Clock and watchmakers accordingly use a very cheap, simple, and portable lathe, called a turn-bench, consisting of a straight bar of iron, about five inches long, with two cross bars or heads, about two inches long, one fixed at the end of the long bar, and the other capable of being shifted by means of a socket and screw. In each of these heads is a centre-pin terminating in a point at one end, and in a central hole at the other, like the centre-pin, in the poppet-head of any other lathe; the use of which is to afford point-centres when the points are turned towards each other, or hole centres when the contrary is the case; and lastly, there is a small rest with its support, slidable and adjustable along the bar, as in another lathe. These instruments, which cost five or six shillings at the watch-tool shops, will therefore support any piece of four or five inches long, and three inches diameter between the centres, and the method of producing the rotation is by passing the catgut string of a bow once or twice round the work, and drawing the bow backwards and forwards with one hand, while the other is employed in applying the tool. The turn-bench itself is held steady in a vice fixed to a bench or stand. See the next article.

TURNING LATHE, a most useful machine, in the arts, for forming all kinds of articles in wood or metal, which have a circular section. It operates, by affixing the piece of work, in such a manner, that it revolves upon a fixed axis or central line: and a cutting tool being held firmly, so as to intercept it in its revolution, cuts it to the required figure. By this means, any circular solid may be formed.

Plate 172 will explain the construction of a very good iron lathe made by Mr. Fox of Derby, for turning wood or metal. Fig. 1 is a front, and fig. 2 a side elevation; figs. 3, 4, 5, 6, 7, and 8, are enlarged drawings of the parts. AA in all these figures represents a cast iron frame consisting of two triangular bars, as is

TURNING LATHE.

Pl. 172



J. Farey, del.

Mutlow, sc. Russell Co.

London, Published by Sherwood & Co. Paternoster Row, Apr. 1, 1813.

shewn in fig. 4; united by solid pieces at each end, and forming what is called the bed of the lathe. These triangle bars are worked perfectly straight, and parallel to each other upon the bed: the puppets B, C, and D, are fastened, by nuts and screws, beneath the bed, which draw them so forcibly down upon it as to make them perfectly fast and solid. The two first puppets, B and C, support the ends of a spindle or axis E *e*, called the mandrel, having a pulley *a* upon it, which is turned round by an endless band, also encompassing the great wheel F, figs. 1 and 2, which is mounted upon a spindle, having a crank in it at *f*; and this communicating with a treadle *g*, on which the workman treads his foot, and by that means turns the wheel round: the wheel having momentum sufficient to move the machine whilst the treadle is rising. The mandrel (see fig. 8) is made of steel, with a sharp conical point at the end *e*, and a collar at the other, which runs in a bearing at the top of the puppet C: beyond the collar it is cut with a screw E, by which any kind of work is fixed to it; the pointed end *e* is received into a small hole in the end of a cylindric steel pin *h* fitted into the top of the puppet B with a screw *i*, to fasten it in. The back puppet D (also figs. 3 and 4) has a similar steel pin, called the centre, but pointed at the end. It has a screw *l*, to force it forwards, and another *m*, to fasten it. The screw *n* fastens the puppet at any part of the bed A. The rest, which supports the tool while turning, is marked G in fig. 1, and shewn separate in figs. 5 and 6. H is a piece of iron fitted on the bed, and can be fastened at any place, by a screw *o*; the same screw fixes down an iron fork *p*, and this at the end has a tube *g*, to receive a pin, on the upper end of which is a cross G, upon which the tool is laid; this can be set at any height, and fastened by the screw *r*.

To explain the use of a lathe, we shall describe the manner of forming a cylinder in wood or ivory. For this purpose, a piece of steel is screwed on the end of the mandrel at E, having three joints, one in the centre, and two others opposite each other, at some distance from it. The piece of wood is roughly carved out to the intended cylinder, perhaps to an octagon, and the central points at each end have a small hole made in them: one of these receives the central pin in the end of the mandrel, and the puppet D being set along the bed to the proper length of the intended cylinder, the point of the centre *k* is forced into the centre point, in the end of the wood, by turning the screw *l* till the wood feels tight and firm: the two other points in the end of the mandrel penetrate the end of the wood, and by this means when the foot wheel F is turned by the treadle *g*, the wood is caused to revolve with a great velocity. The rest G is set, when the screw *o* is slack, to be as near the revolving wood as it can without touching, then by turning the screw *o* it is made fast: a chisel or goudge is held firmly upon the edge of the rest G, and its cutting edge presented to the wood as it revolves: this of course cuts away any parts projecting beyond the circle the wood describes, and the chisel being in this manner gradually advanced towards the centre, the size of the circle is diminished to any extent, and by this means (shifting the rest when requisite) a cylinder, or any other figure of a circular section, may be formed, as a column, pillar, &c. &c. This method is called turning between centres: but for turning hollow work, as cups, tubes, &c. another method is employed. A block of hard wood is screwed on the end of the mandrel, as at *t*, fig. 1, and a hollow turned in it like a circular dish; into this hollow, the piece of wood or metal *v* to be turned is driven fast, and then turns about with it, the rest being fixed at the end, and the puppet D removed. Various other methods are employed to fix pieces of work to the end of the mandrel, the turner being guided by no precise rules; but trusting to ingenuity to supply an expedient for every occasion. Wooden chucks are made of all sizes and forms, and frequently small screws are used, to fasten the work to them. For some work, metal chucks are employed; such as are represented in figs. 9 and 10. A circular plate *n* screws on the end of the mandrel, and is turned perfectly flat: the work is held fast against it by three screws, *o*, *p*, *q*, which pass through projecting knobs of the main flute: *r* represents a piece of brass work, fastened in this manner, to be turned; but it will be seen that the outside cannot be turned in this manner, only the inside and centre; therefore this chuck is only applicable to particular purposes.

There are several other ingenious methods of turning, but our bounds do not permit us to enter upon them. We shall therefore conclude this article with a number of receipts, which every turner ought to know.

1. The method of moulding boxes both of shell and horn. In the first place, form a proper mould, which must consist of two pieces, viz. of a circle about half an inch thick, which should slope a little, in order to draw out the moulded shell the more easily; and a ring fitted to the outside of the circle, so that both together make the shape of a box. These two pieces being adjusted, it is necessary to round the shell to be moulded of such a size, that when moulded, it will be a little higher than the ring of the mould, that there may be no deficiency. The mould is then to be put into a press on a plate of iron, exactly under the screw of the press; put then the shell upon the circle of the mould, so that its centre also is exactly opposite to the screw of the press: then take a piece of wood formed into a truncated cone, and not so thick as the diameter of the circle of the mould, nor so deep as the ring; then put a plate of iron above the cone, and screw down the press gently and cautiously till the whole is well fixed; then plunge the whole into a cauldron of boiling water placed above a fire. In eight or ten minutes the shell or horn will begin to soften; screw the press a little firmer, that the wooden cone may sink

into the softened shell: repeat this from time to time till the cone is quite sunk in the mould; then take out the press and plunge it into cold water. When it is cold, take the box now formed out of the mould, and put into the inside of it a new mould of tin exactly of the form you wish the inside of the box to be; do the same with the outside, put it again into the press, and plunge it into boiling water; screw the press gradually till the box is fashioned as you desire.

2. Method of preparing green wood so that it will not split in the turning. Having cut your wood into pieces of a proper size, put it into a vessel full of ley made with wood ashes. Boil it there about an hour; then, taking the cauldron off the fire, allow the ley to cool; then take out the wood and dry it in the shade.

3. Method of giving an ebony-black to hard and fine woods. After forming the wood into the destined figure, rub it with aqua fortis a little diluted. Small threads of wood will rise in the drying, which you will rub off with pumice-stone. Repeat this process again, and then rub the wood with the following composition: put into a glazed earthen vessel a pint of strong vinegar, two ounces of fine iron-filings, and half a pound of pounded galls, and allow them to infuse for three or four hours on hot cinders. At the end of this time augment the fire, and pour into the vessel four ounces of copperas (sulphat of iron), and a chopin of water having half an ounce of borax and as much indigo dissolved in it; and make the whole boil till a froth rises. Rub several layers of this upon your wood; and, when it is dry, polish it with leather on which you have put a little tripoli.

4. Method of giving to plum-tree the colour of Brazil wood. Slack lime with urine, and bedaub the wood over with it while it is hot; allow it to dry; then take off the coat of lime, and rub it with chamois-skin well oiled. Or, steep your wood in water having a quantity of alum dissolved in it, five or six hours, kept lukewarm during a night; and when it is dry, rub it, as before directed, with chamois-skin well oiled.

5. Method of giving a fine black colour to wood. Steep your wood for two or three days in lukewarm water in which a little alum has been dissolved; then put a handful of logwood, cut small, into a pint of water, and boil it down to less than half a pint. If you then add a little indigo, the colour will be more beautiful. Spread a layer of this liquor quite hot on your wood with a pencil, which will give it a violet-colour. When it is dry, spread on another layer; dry it again, and give it a third; then boil verdigris at discretion in its own vinegar, and spread a layer of it on your wood; when it is dry, rub it with a brush, and then with oiled chamois-skin. This gives a fine black, and imitates perfectly the colour of ebony.

6. Method of cleaning and whitening bones before using them. Having taken off with a saw the useless ends of the bones, make a strong ley of ashes and quick-lime, and into a pailful of this ley put four ounces of alum, and boil the bones in it for an hour; then take the vessel containing the ley off the fire, and let it cool; then take out the bones and dry them in the shade.

7. Method of soldering shells. Clean the two sides of the shells which you wish to join together; then, having joined them, wrap them up in linen folded double and well moistened; then heat two plates of iron pretty hot, that they may keep their heat for some time; and putting your shells rolled up between them under a press, which you must screw very tight, leave them there till the whole is cold, and they will be soldered. If you do not succeed the first time, repeat the process.

8. Method of moulding shells. Put six pints of water into a kettle; add to it an ounce of olive or other oil; make the water boil; then put in your shell, and it will grow soft. Take it out, and put it into a mould under a press, and it will take the figure you want. This must be done quickly; for if the shell cools ever so little, the process will fail. It will not require much pressure.

9. Method of tinging bones and ivory red. Boil shavings of scarlet cloth in water. When it begins to boil, throw in a quarter of a pound of ashes made from the dregs of wine, which will extract the colour: then throw in a little rock alum to clear it, and pass the water through a linen cloth. Steep your ivory or bone in aqua fortis, and put it into the water. If you wish to leave white spots, cover the places destined for them with wax.

10. To tinge ivory black. Steep the ivory during five or six days in water of galls, with ashes made with dried dregs of wine and arsenic; then give it two or three layers of the same black with which plum-tree is blackened in order to imitate ebony. Or dissolve silver in aqua fortis, and put into it a little rose water. Rub the ivory with this, and allow it to dry in the sun.

11. Method of hardening wood to make pulleys. After finishing the pulley, boil it seven or eight minutes in olive-oil, and it will become as hard as copper.

12. To make chinese varnish. Take of gum lac in grains four ounces; put it into a strong bottle with a pound of good spirit of wine, and add about the bulk of a hazel-nut of camphor. Allow them to mix in summer in the sun, or in winter on hot embers for twenty-four hours, shaking the bottle from time to time. Pass the whole through a fine cloth, and throw away what remains upon it. Then let it settle for twenty-four hours, and you will find a clear part in the upper part of the bottle, which you must separate gently and put into another phial, and the remains will serve for the first layers.

TU'RNINGNESS. *s.* (from *turning.*) Quality of turning; tergiversation; subterfuge (*Sidney*).

TURNIP, in botany. See BRASSICA.

TURNPI'KE. *s.* (*turn* and *pike*, or *pique.*) 1. A cross of two bars armed with pikes at the end, and turning on a pin, fixed to hinder horses from entering. 2. Any gate by which the way is obstructed (*Arbuthnot*).

TU'RNSICK. *a.* (*turn* and *sick.*) Vertiginous; giddy (*Bacon*).

TURNSOLE, in botany. See Croton.

TU'RNSPIT. *s.* (*turn* and *spit.*) He that anciently turned a spit, instead of which jacks are now generally used. It is now used of a dog that turns the spit. See Canis.

TU'RNSTILE. *s.* (*turn* and *stile.*) A turnpike in a footpath (*Gay*).

TURNSTONE, in ornithology. See Tringa.

TURON, a seaport of Cochinchina, situate on a bay of the same name, which affords a safe retreat for the largest ships in the most tempestuous season. In the vicinity are plantations of sugar-canes and tobacco. Turon is 40 miles S.E. of Hue. Lon. 107. 40 E. Lat. 16. 9 N.

TURPENTINE. The resinous product of different species of the pine-tree.

There are three varieties of pine-tree turpentine commonly known under this name in Europe. 1st. The common turpentine, obtained chiefly from the pinus sylvestris (Scotch fir); 2d. the Strasburg turpentine, extracted from the pinus picea (silver fir); and 3d, the Venice turpentine, procured from the pinus laryx (larch). To these may be added two liquid turpentines: as 4th, the Carpathian or Hungary balsam, which exsudes from the pinus lembra (Siberian stone-pine). 5th. The Canada balsam, or resinous juice of the pinus balsamea (balm of Gilead fir). The fine fragrant Chio turpentine is not procured from a pine, but from a low shrub, the pistacea lentiscus.

Of the three first mentioned turpentines, the Venice is the thinnest and most aromatic; the Strasburg the next in these qualities; and the common is the firmest and coarsest. The two former are often adulterated by a mixture of the common turpentine and oil of turpentine; and it is to be observed that the terms Venice and Strasburg turpentine are not now appropriated, as they are procured from various countries.

Common turpentine is obtained largely in the pine-forests in the south of France, in Switzerland, in the Pyrennees, in Germany, and in many of the southern states of North America; and it has also been occasionally obtained, though in small quantity, in our own country. The greater part of what is consumed in England is, or at least has been till of late, imported from North America. The method of obtaining it is by making a series of incisions through the bark of the tree, from which the turpentine exsudes, and falls into holes or other receptacles at the foot. The age of the fir, when first operated upon, is from thirty to forty years old. The coarse bark is first stripped off from the tree, a little above the hole into which the turpentine is designed to run, down to the smooth inner bark; after which a portion of the inner bark, together with a little of the wood, is cut out with a sharp tool, so that there may be a wound in the tree about three inches square and an inch deep. The working commences about April, and continues through the summer.

"The cutting the trees," says an intelligent writer in the Transactions of the Society of Arts and Manufactures, "for the purpose of collecting is called boxing them, and it is reckoned a good day's work to box sixty in a day; the trees will not run longer than four years, and it is necessary to take off a thin piece of the wood about once a week, and also as often as it rains, as that stops the trees running. While in North Carolina, I was particular in my inquiries respecting the making of tar and pitch, and I saw several tar-kilns; they have two sorts of wood that they make it from, both of which are the pitch-pine; the sort from which most of it is made are old trees, which have fallen down in the woods, and the sap rotted off, and is what they call lightwood, not from the weight of it, as it is very heavy, but from its combustible nature, as it will light with a candle, and a piece of it thrown into the fire will give light enough to read and write by. All the pitch-pine will not become lightwood; the people concerned in making tar know it from the appearance of the turpentine in the grain of the wood. The other sort of wood which is used, after the trees which have been boxed for turpentine have done running, they split off the faces over which the turpentine has run; and of this wood is made what is called green tar, being made from green wood instead of dry.

"When a sufficient quantity of wood is got together, the first step is to fix a stake in the ground, to which they fasten a string, and from the stake, as a centre, they describe a circle on the ground according to the size they wish to have the kiln. They consider that one, twenty feet in diameter, and fourteen feet high, should produce them two hundred barrels of tar. They then dig out all the earth a spit deep, shelving inwards within the circle, and sloping to the centre; the earth taken out is thrown up in a bank about one foot and a half high round the edge of the circle; they next get a pine that will split straight, of a sufficient length to reach from the centre of the circle some way beyond the bank; this pine is split through the middle, and both parts are then hollowed out, after which they are put together, and sunk in such a way, that one end, which is placed in the centre of the circle, is higher than that end which comes without the bank, where a hole is dug in the ground for the tar to run into, and whence the tar is taken up and barrelled as it runs from the kiln. After the kiln is marked out, they bring the wood, ready split up, in small billets, rather smaller than are generally used for the fires in England, and it is then packed as close as possible, with the end inwards, sloping towards the middle, and the middle is filled up with small wood and the knots of trees, which last have more tar in them than any other part of the wood. The kiln is built in such a way, that at twelve or fourteen feet high it will overhang two or three feet, and it appears quite compact and solid. After the whole of the wood is piled on, they get a parcel of small logs, and then place a line of turf, then another line of logs, and so on alternately all the way up, and the top they cover with two or three thicknesses of turf. After the whole is covered in this way, they take out a turf in ten or a dozen different places round the top, at each of which they light it, and it then burns downwards till the whole of the tar is melted out; and if it burns too fast they stop some of the holes, and if not fast enough they open others, all of which the tar-burner, from practice, is able to judge of. When it begins to run slow, if it is near where charcoal is wanted, they fill up all the holes, and watch it, to prevent the fire breaking out any where till the whole is charred. The charcoal is worth two-pence or three-pence, British sterling, per bushel. It will take six or eight days to burn a tar-kiln; in some places they burn it at such a distance from the shipping, that they have very far to roll it, and even then sell it at from three and six-pence to five shillings, British sterling, per barrel, sometimes taking the whole out in goods, but never less than half the amount in goods; from all which it will be reasonably supposed that tar burning in that country is but a bad trade, as it must be a good hand to make more than at the rate of a barrel a day; the barrels cost the burner about one shilling and three-pence, British sterling, each: the tar makers are in general very poor, except here and there one, that has an opportunity of making it near the water side.

"Pitch is made by either boiling the tar till it comes to a proper thickness, or else by burning it; the latter is done by digging a hole in the ground, and lining it with brick, it is then filled with tar, and they set fire to it, and allow it to burn till they judge it has burnt enough, which is known by dipping a stick into it, and letting it cool; when burnt enough they put a cover over it, which stops it close, and puts out the fire. Five barrels of green tar will make two of pitch; and it will take two barrels of other tar to make one of pitch."

The turpentine thus obtained is loaded with impurities, from which it is freed by two distinct methods. One consists in inclosing it in a cask perforated at bottom, when, by exposure to a hot sun, it becomes so fluid as to filter through, which gives the finest and most valued turpentine. The other method consists in heating it moderately in a large copper, till it is quite liquid, and then filtering it through a strainer made of rows of straws laid close to each other. This gives it a golden colour.

The essential oil of turpentine is prepared largely both in the countries where the turpentine is extracted, and from turpentine imported to our own coasts. The process is as follows: An alembic with a worm and cooler is used, precisely of the same construction as what is employed for the distillation of spirits: this is filled with turpentine and water in due proportions, and the volatile part, after distillation, is found to consist of oil of turpentine swimming on the water. This oil is perfectly limpid and colourless, has a very strong smell, a bitterish taste, is extremely inflammable, and has all the properties of the other essential oils. It is employed in immense quantities in a variety of varnishes and similar preparations; but for the finer purposes, such, for example, as that of dissolving gum copal, it is necessary to rectify it by a second distillation with water in a still, using a very gentle heat, and keeping apart the first product, which is the best. From 250lb. of good turpentine the oil obtained is about 60lb.

Common, or yellow rosin, is the brittle and opaque residue from the distillation of the oil of turpentine. It is called by the French *brai-sec*; who also obtain it from the hard concrete turpentine that forms about the incision of the fir-trees, while exsuding. When common rosin is boiled in water for a time, it becomes yellow and transparent; and is then the rosin used by musicians for the bows and strings of violins. When common rosin is kept in fusion for a considerable time it becomes of a browner colour; is still harder and less adhesive to the fingers when cold, and is then called black rosin, or colophony; and this is the ultimate point to which the inspissation of turpentine is carried.

A very fine essential oil is obtained in some parts of Germany by distillation of the green tops and cones of the stone-pine (pinus lembra), which is known in medicine by the name of oleum templinum, or popularly, krumholzoel. It is somewhat greenish, or sometimes of a golden yellow, very fragrant and aromatic.

True Burgundy pitch is a kind of rosin prepared in large quantities in the neighbourhood of Neuschatel, from the Norway spruce fir. The turpentine of this fir is peculiarly thick, and hence concretes around the incisions without flowing down. It is in this manner picked off, and when a sufficient quantity is collected, it is put with water into large boilers, melted, and then strained under a press, through close cloths, into barrels, in which it is transported for sale. Burgundy pitch, thus procured, is a brittle, opaque, light-yellow, or sometimes reddish-brown rosin, of such consistency that it will barely soften by the heat of the human body; and is hence much used in plasters. This substance is also sometimes obtained from the larch.

The rosin called frankincense is supposed to exsude spontaneously, and not by incision, from the Norway spruce, and to undergo no preparation. It is brittle, in small roundish masses, of a brownish yellow on the outside, and white internally. It possesses the common properties of the turpentines, and has a very pleasant smell when burnt. Ants, for some unknown purpose, collect this substance, which is found in pieces throughout their nests or hills, and was at one time supposed to be a secretion of their own, and hence distinguished by the name of electrum formicarum, as it was also by that of wild frankincense, thus Germanicum, suffimentum silvestre.

All the turpentines in medicine have been considered as hot, stimulating corroborants and detergents; qualities which they possess in common. They stimulate the primæ viæ, and prove laxative; when carried into the blood-vessels they excite the whole system, and thus prove serviceable in chronic rheumatism and paralysis. Turpentine readily passes off by urine, which it imbues with a peculiar odour; also by perspiration and by exhalation from the lungs: and to these respective effects are ascribed the virtues it possesses in gravelly complaints, scurvy, and pulmonic disorders. Turpentine is much used in gleets and fluor albus, and in general with much success. The essential oil, in which the virtues of turpentine reside, is not only preferred for external use as a rubefacient, but also internally as a diuretic and styptic; the latter of which qualities it possesses in a very high degree. Formerly turpentine was much used as a digestive application to ulcers, &c. but in the modern practice of surgery it is almost wholly exploded.

TURPENTINE TREE. See PISTACIA.

TURPETH MINERAL. See HYDRARGYRUS VITRIOLATUS.

TURPETHUM. (from *turpeth*, Ind.) Turpeth. The cortical part of the root of a species of convolvulus, the convolvulus turpethum of Linnéus, brought from the East Indies, in oblong pieces, of a brown or ash colour on the outside, and whitish within: the best is ponderous, not wrinkled, easy to break, and discovers to the eye a large quantity of resinous matter. When chewed, it at first imparts a sweetish taste, which is followed by a nauseous acrimony. It is considered as a purgative, liable to much irregularity of action.

TURPETHUM MINERALE. See HYDRARGYRUS VITRIOLATUS.

TU'RPITUDE. *s.* (*turpitudo*, Latin.) Essential deformity of words, thoughts, or actions; inherent vileness; badness (*South*).

TURQUOISE, in mineralogy, a substance which is generally considered as fossile bone or ivory, penetrated by oxyd of copper. It appears, however, from the following analysis of La Grange, that the colouring matter is oxyd of iron; as he found it to contain

Phosphat of lime	-	80
Carbonat of lime	-	8
Phosphat of iron, with a trace of manganese	-	2
Phosphat of magnesia	-	2
Alumine	- -	1
Water and loss	-	7
		100

The colour is pale sky-blue, passing into indigo blue, and pale apple-green. It occurs in mass, or disseminated; fracture even; hardness nearly equal to that of glass; it is difficultly frangible; specific gravity 3.12. It hence fairly belongs, in the mineral classification we have adopted, to the genus zoolithus of petrefactions. See ZOOLITHUS.

The oriental turquoises are found near Meched, in Persia; also in mount Caucasus, in Egypt, and Arabia. The occidental ones are found in Languedoc in France, and in Hungary. Turquoise was formerly in estimation for rings, and other articles of personal ornament; but its value has greatly declined in modern times, chiefly on account of the deterioration of its colour upon long exposure to the atmosphere.

TURRÆA, in botany, a genus of the class decandria, order monogynia. Calyx five-toothed; petals five; nectary toothed, cylindrical, bearing the anthers in the mouth between the teeth; capsule five-grained; seeds two. Five species; trees or shrubs of India and Madagascar.

TU'RRET. *s.* (*turris*, Lat.) A small eminence raised above the rest of the building; a little tower (*Fairfax*).

TU'RRETED. *a.* (from *turret*.) Formed like a tower; rising like a tower (*Bacon*).

TURRETIN (Francis), minister and professor of divinity at Geneva, his native place, was born in 1623. Having studied at Geneva, Leyden, Saumur, Montauban, and Nismes, with great success, he was admitted into the ministry in 1648, and served at the same time the French and Italian churches at Geneva. Two years after, he was offered the professorship of philosophy, which he refused; but accepted the invitation of the church of Lyons. He was recalled to Geneva at a year's expiration, because he was wanted to give lectures in divinity; which he began in 1653. He was sent to Holland in 1661, to procure money which the city of Geneva had occasion for. He had in that journey all the success he could promise himself; and gained such a character there, that he was strongly importuned by the Walloon churches at the Hague and at Leyden to enter into their service. On his return he resumed the functions of his place, and continued there till his death, with remarkable application. He died in 1687, with the character of a man of great merit; eloquent, judicious, laborious, learned, and zealous for orthodoxy. His works were published by his son John Alphonsus, in 3 and in 4 vols. 4to.

TURRITIS. Tower-mustard. In botany, a genus of the class tetradynamia, order siliquosa. Silique very long, straight, somewhat angular; calyx closed, erect; corol erect. Eight species; chiefly natives of Europe, one or two of America; two, turritis glabra, and turritis hirsuta, common to our own pastures or rocks.

TURTLE, in ichthyology. See TESTUDO.

TURTLE DOVE, in ornithology. See COLUMBA.

TUSCAN ORDER, in architecture, the first, simplest, and most massive of the five orders. See ARCHITECTURE.

TUSCANY, a country of Italy, lately a grand duchy, belonging to the house of Austria. It is 120 miles long and 80 broad; bounded on the N. and E. by the Ecclesiastical State, S. by the Mediterranean, and W. by that sea, the territory of Lucca, and the Modenese. Beside this, a small part of the duchy, to the N.W. is inclosed by the sea and the territories of Genoa, Parma, Modena, and Lucca. Tuscany is divided into three provinces, the Florentino, Pisano, and Siennese. It is watered by several rivers, of which the Arno is the chief. There are several mountains, in which are mines of iron, alum, and vitriol; also quarries of marble, alabaster, and porphyry, beside hot baths and mineral waters. Many parts of it are fruitful in corn and wine, and produce plenty of citrons, oranges, pomegranates, and other fruits. Manna is gathered in the marshy lands near the sea, and the salt pits are rich. The inhabitants are distinguished by their attachment to commerce, and have established various manufactures, particularly of silks, stuffs, earthen ware, and gilt leather. They are much visited by foreigners, on account of their politeness, and because the Italian language is here spoken in its greatest purity. John Gaston, the last duke of Tuscany, of the house of Medici, died in 1737, without leaving any heirs male. By the treaty of London, 1718, the emperor of Germany, Charles VI. had promised Tuscany, as a fief of the empire, to don Carlos, infant of Spain, as being the nearest male heir; but, in 1735, when the sovereignty of Naples and Sicily was confirmed to that prince, he renounced his right to Tuscany, in favour of Francis, duke of Lorrain, as an equivalent for that duchy, which he had ceded to France. Francis succeeded to the grand duchy in 1735, and he was raised to the dignity of emperor of Germany in 1745, by which means Tuscany became annexed to the house of Austria. In 1801, on the ascendency of the French in Italy, the Austrian archduke Ferdinand was obliged to give up Tuscany to a prince of Spain, Louis, the son of the duke of Parma, to whom the French gave the sovereignty by the name of the kingdom of Etruria; and it was formally ceded to him by the treaty of Luneville. Florence is the capital.

TUSH. *interj.* An expression of contempt (*Psalms*).

TUSHES, are the fore-teeth of a horse, seated beyond the corner teeth, upon the bars, where they shoot forth on each side of the jaws, two above, and two below, about the age of three, and three and a half, and sometimes four; and no milk or foal teeth ever appear in the place where they grow. See AGE OF A HORSE and TEETH.

TUSK. *s.* (ꞇẏxaꞃ, Sax. *tosken*, old Frisic.) The long tooth of a pugnacious animal; the fang; the holding tooth (*Dryden*).

TU'SKED. TU'SKY. *a.* (from *tusk.*) Furnished with tusks (*Grew.*)

TUSSILAGO. Colt's-foot. In botany, a genus of the class syngenesia, order polygamia superflua. Receptacle naked; down simple; calyx simple, many-leaved, equal, somewhat membranaceous, swelling at the base; florets of the ray very entire. Twenty-one species; chiefly natives of Europe and America; one of two of Japan; two only natives of our own country.

1. T. farfarra. Common colt's-foot. Scape one-flowered, scaly; flower radiate; leaves heart-shaped, angular, toothed, downy underneath. Found in moist lands. The sensible qualities of this plant are very inconsiderable; it has a rough mucilaginous taste, but no remarkable smell. The leaves have always been esteemed as possessing demulcent and pectoral virtues, and hence they have been exhibited in pulmonary consumptions, coughs, asthmas, and catarrhal affections. It is used as tea, or given in the way of infusion with liquorice-root or honey.

2. T. petasites. Butter-bur. Thyrse ovate-oblong; rayless; leaves heart-shaped, acute, pubescent underneath, the lobes approximate. Found in wet marshes and on the sides of ditches, and formerly employed medicinally under its specific name; for which, see PETASITES.

There is a variety of this species which was till lately regarded as a distinct species, and described under the name of tussilago hybrida; it is, however, a mere variety.

TUSSIS. A cough. A sonorous concussion of the breast, produced by the violent, and, for the most part, involuntary motion of the muscles of respiration. It is symptomatic of many diseases.

TUSSIS CONVULSIVA. See PERTUSSIS.

TUSSIS EXANTHEMATICA. A cough attendant on an eruption.

TUSSIS FERINA. See PERTUSSIS.

TU'SSUCK. *s.* (diminitive of *tuz.*) A tuft of grass or twigs (*Grew*).

TUT. *interj.* A particle noting contempt (*Shakspeare*).

TU'TELAGE. *s.* (*tutelle, tutelage*, Fr. *tutela*, Lat.) Guardianship; state of being under a guardian (*Drummond*).

TU'TELAR. TU'TELARY. *a.* (*tutela*, Lat.) Having the charge or guardianship of any person or thing; protecting; defensive; guardian (*Temple. Dryden*).

TUTENAG, in mineralogy, a species of zinc. See ZINCUM.

TUTIA. (*tutia*, Persian.) Pompholyx. Cadmia. Tutty. A grey oxyd of zinc. It is generally formed by fusing lead ore mixed with blende, when it is incrusted in the chimneys of the furnace. Mixed with any common cerate, it is applied to the eye, in debilitated states of the conjunctive membrane.

TUTIA PREPARATA. Prepared tutty is often put into collyriums, to which it imparts an adstringent virtue.

TUTOR, in the civil law, is one chosen to look to the person and state of children left by their fathers and mothers in their minority. A person nominated tutor either by testament, or by the relations of the minor, is to decline that office if he has five children alive, if he has any other considerable tutorage, if he is under twenty-five years of age, if he is a priest, or a regent in an university, or if he has any law-suit with the minors, &c. The marriage of a pupil, without the consent of his tutor, is invalid. Tutors may do any thing for their pupils, but nothing against them; and the same laws which put them under a necessity of preserving the interest of the minors, put them under an incapacity of hurting them.

Tutor, is also used in our universities for a member of some college or hall, who takes on him the instruction of some young students in the arts or faculties.

To Tu'tor. *v. a.* (from the noun.) 1. To instruct; to teach; to document (*Shakspeare*). 2. To treat with superiority or severity (*Addison*).

TU'TORAGE. *s.* (from *tutor.*) The authority or solemnity of a tutor (*Gov. of the Tongue*).

Tutorage, (*tutela*), in the civil law, a term equivalent to guardianship in the common law, signifying an office imposed on any one to take care of the effects of one or more minors. See Guardian and Tutor.

By the Roman law, there are three kinds of tutorage; testamentary, which is appointed by the father's testament; legal, which is given by the law to the nearest relation; and dative, which is appointed by the magistrate. But in all customary provinces, all tutorages are dative and elective; and though the father has by testament nominated the next relation to his pupil, yet is not that nomination of any force, unless the choice is confirmed by that of the magistrate, &c. By the Roman law, tutorage expires at fourteen years of age.

TU'TORESS. *s.* (from *tutor.*) Directress; instructress; governess (*Moore*).

TUTSAN, in botany. See Hyparicum.

TUTTY. See Tutia.

TUYERE. The pipe of a pair of bellows, or other blowing engine.

TUZ. *s.* (probably a word merely of cant.) A lock or tuft of hair (*Dryden*).

TWAIN. (ꞇƿᵹen, baꞇƿa, both twain, Sax.) Two (*Dryden*).

To TWANG. *v. n.* (formed from the sound.) To sound with a quick sharp noise (*Pope*).

To Twang. *v. a.* To make to sound sharply (*Shakspeare*).

Twang. *s.* (from the verb.) 1. A sharp quick sound (*Butler*). 2. An affected modulation of the voice (*Arbuthnot*).

Twang. *interj.* A word marking a quick action accompanied with a sharp sound (*Prior*).

TWA'NGLING. *a.* (from *twang.*) Contemptibly noisy (*Shakspeare*).

To TWANK. *v. n.* (corrupted from *twang.*) To make to sound (*Addison*).

'TWAS. Contracted from *it was* (*Dryden*).

To TWA'TTLE. *v. n.* (*schwatzen*, Ger.) To prate; to gabble; to chatter (*L'Estrange*).

TWAY. For Twain (*Spenser*).

TWAYBLADE, in botany. See Ophrys.

To TWEAG. *To* Tweak. *v. a.* (*twacken*, German.) To pinch; to squeeze between the fingers (*Butler*).

TWEAGUE. Tweak. *s.* (from the verb.) Perplexity; ludicrous distress (*Arbuthnot*).

TWEED, a river of Scotland, which rises on the confines of the shire of Clydesdale, and running eastward through Tweedale, and dividing the shire of Merse from Teviotdale and Northumberland, falls into the German sea at Berwick. It abounds with salmon.

TWEEDALE. See Peebleshire.

To TWE'EDLE. *v. a.* To handle lightly: used of awkward fiddling (*Addison*).

TWE'EZERS. *s.* (*etuy*, Fr.) Nippers, or small pincers, to pluck off hairs (*Pope*).

TWELFTH. *a.* (ꞇƿelꝼꞇa, Saxon.) Second after the tenth; the ordinal of twelve.

Twelfth-day, in chronology, the feast of Epiphany, called thus because it is the twelfth-day exclusive from the nativity or Christmas-day.

TWE'LFTHTIDE. *s.* The twelfth day after Christmas (*Tusser*).

TWELVE. *a.* (ꞇƿelꝼ, Sax.) Two and ten; twice six.

TWE'LVEMONTH. *s.* (*twelve* and *month.*) A year, as consisting of twelve months (*Shakspeare*).

TWE'LVEPENCE. *s.* (*twelve* and *pence.*) A shilling.

TWE'LVEPENNY. *a.* (*twelve* and *penny.*) Sold for a shilling (*Dryden*).

TWE'LVESCORE. *s.* (*twelve* and *score.*) Twelve times twenty; two hundred and forty (*Dryden*).

TWE'NTIETH. *a.* (ꞇƿenꞇeoᵹoða, Saxon.) Twice tenth; ordinal of twenty.

TWE'NTY. *a.* (ꞇƿenꞇiᵹ, Sax.) 1. Twice ten. 2. A proverbial or indefinite number (*Bacon*).

TWI'BIL. *s.* (*twy* for *two*, and *bill.*) A halbert (*Ainsworth*).

TWICE. *ad.* (ꞇƿiᵹið, Sax. *twees*, Dutch.) 1. Two times (*Spenser*). 2. Doubly (*Dryden*).

To TWI'DLE. *v. a.* (commonly written *tweedle.*) To touch lightly (*Wiseman*).

TWIG. *s.* (ꞇƿiᵹ, ꞇƿiᵹᵹa, Sax. *twyg*, Dut.) A small shoot of a branch; a switch tough and long (*Sandys*).

TWI'GGEN. *a.* (from *twig.*) Made of twigs; wicker (*Grew*).

TWI'GGY. *a.* (from *twig.*) Full of twigs.

TWI'LIGHT. *s.* (*tweelicht*, Dut. ꞇƿeoneleohꞇ, Saxon.) 1. The dubious or faint light before sunrise, and after sunset; obscure light (*Donne*). 2. Uncertain view (*Cleaveland*).

Twi'light. *a.* 1. Not clearly or brightly illuminated; obscure; deeply shaded (*Pope*). 2. Seen or done by twilight (*Milton*).

Twilight, in astronomy, is that faint light which is perceived before the sun-rising, and after sun-setting. The twilight is occasioned by the earth's atmosphere refracting the rays of the sun, and reflecting them among its particles.

The depression of the sun below the horizon, at the beginning of the morning, and end of the evening twilight, has been variously stated, at different seasons, and by different observers: by Alhazen it was observed to be 19°; by Tycho 17°; by Rothman 24°; by Stevinus 18°; by Cassini 15°; by Riccioli, at the time of the equinox in the morning 16°, in the evening 20°½; in the summer solstice in the morning 21° 25′, and in the winter 17° 15′. Whence it appears that the cause of the twilight is variable; but, on a medium, about 18° of the sun's depression will serve tolerably well for our latitude, for the beginning and end of twilight, and according to which it is easy to compute the duration of twilight for any latitude and declination.

To find the time of shortest twilight at any given place, say as radius, to the sine of the latitude, so is the tangent of 9°, to the sine of the sun's declination at the time required. The declination of the sun and the latitude of the place must be of contrary kinds. Hence at about 51 or 52 degrees north latitude, the twilight will be shortest at about the 2d or 3d of March, and the 11th or 12th of October.

TWIN. *s.* (ꞇƿinn, Sax. *tweelingen*, Dut.) 1. One of two children born at a birth. It is seldom used in the singular (*Cleaveland*). 2. Gemini, the sign of the zodiac (*Creech*).

To Twin. *v. n.* (from the noun.) 1. To be born at the same birth (*Shakspeare*). 2. To bring two at once (*Tusser*). 3. To be paired; to be suited (*Sandys*).

Twin anther, in botany. Didyma anthera. Swelling out into two protuberances: as in ranunculus, mercurialis.—Applied also to germ and pericarp: as in veronica.

TWINBO′RN. *a.* (*twin* and *born*.) Born at the same birth (*Shakspeare*).

To TWINE. *v. a.* (ꞇƿinan, Sax. *twynan*, Dutch.) 1. To twist or complicate so as to unite, or form one body or substance out of two or more (*Exodus*). 2. To unite itself (*Crashaw*).

To Twine. *v. n.* 1. To convolve itself; to wrap itself closely about (*Pope*). 2. To unite by interposition of parts (*Shakspeare*). 3. To wind; to make flexures (*Swift*). 4. To turn round (*Chapman*).

Twine. *s.* (from the verb.) 1. A twisted thread (*Dryden*). 2. Twist; convolution (*Milton*). 3. Embrace; act of convolving itself round (*Philips*).

To TWINGE. *v. a.* (*twingen*, Ger.) 1. To torment with sudden and short pain (*L'Estrange*). 2. To pinch; to tweak (*Hudibras*).

Twinge. *s.* (from the verb.) 1. Short sudden sharp pain (*Dryden*). 2 A tweak; a pinch (*L'Estrange*).

TWINING STEM, in botany. Caulis volubilis. Ascending spirally round a branch, stem, or prop. This is done either from right to left, contrary to the sun's apparent motion, as in hops, honeysuckle, black bryony, &c. or from left to right, with the sun, as in convolvulus, basella, phaseolus, cynanche, euphorbia, eupatorium.

In order to understand this, we must conceive the spectator to stand with his face towards the south, when of course the east will be towards his left hand. Thus stationed, if he observe a stalk of convolvulus or kidney bean, he will see that it twines from the left or east, by the south, towards the west; and that a honeysuckle or hop takes a contrary direction. Who will reveal the cause of this difference?

TWINK. *s.* (See Twinkle.) The motion of an eye; a moment: not in use (*Shakspeare*).

To TWI′NKLE. *v. n.* (ꞇƿinclian, Sax.) 1. To sparkle; to flash irregularly; to shine faintly; to quiver (*Newton*). 2. To open and shut the eye by turns (*L'Estrange*). 3. To play irregularly (*Donne*).

Twi′nkle. Twi′nkling. *s.* (from the verb.) 1. A sparkling intermitting light. 2. A motion of the eye (*Spenser*). 3. A short space, such as is taken up by a motion of the eye (*Dryden*).

Twinkling of the stars, that tremulous motion which is observed in the light that proceeds from the fixed stars.

Dr. Jurin, in his Essay upon Distinct and Indistinct Vision, has recourse to Newton's hypothesis of fits of easy refraction and reflection for explaining the twinkling of the stars: thus, he says, if the middle part of the image of a star be changed from light to dark, and the adjacent ring at the same time be changed from dark to light, as must happen from the least motion of the eye towards or from the star, this will occasion such an appearance as twinkling.

Mr. Michell (Philos. Trans. vol. 57, pa. 262.) supposes that the arrival of fewer or more rays at one time, especially from the smaller or more remote fixed stars, may make such an unequal impression on the eye, as may at least have some share in producing this effect: since it may be supposed that even a single particle of light is sufficient to make a sensible impression on the organs of sight; so that very few particles arriving at the eye in a second of time, perhaps not more than three or four, may be sufficient to make an object constantly visible. See Light.

Hence, he says, it is not improbable that the number of the particles of light which enter the eye in a second of time, even from Syrius himself, may not exceed 3 or 4 thousand; and from stars of the 2d magnitude they may probably not exceed 100. Now the apparent increase and diminution of the light, which we observe in the twinkling of the stars, seem to be repeated at intervals not very unequal, perhaps about 4 or 5 times in a second. He therefore thought it reasonable to suppose, that the inequalities which will naturally arise from the chance of the rays coming sometimes a little denser, and sometimes a little rarer, in so small a number of them, as must fall upon the eye in the 4th or 5th part of a second, may be sufficient to account for this appearance.

Since these observations were published, however, Mr. Michell (as we are informed by Dr. Priestley in his Hist. of Light, pa. 495) has entertained some suspicion, that the unequal density of light does not contribute to this effect in so great a degree as he had imagined; especially as he has observed that even Venus does sometimes twinkle. This he once observed her to do remarkably when she was about 6 degrees high, though Jupiter, which was then about 16 degrees high, and was sensibly less luminous, did not twinkle at all. If, notwithstanding the great number of rays which doubtless come to the eye from such a surface as this planet presents, its appearance be liable to be affected in this manner, it must be owing to such undulations in the atmosphere as will probably render the effect of every other cause altogether insensible.

Musschenbroek suspects (Introd. ad Phil. Nat. vol. 2. sect. 1741, pa. 707) that the twinkling of the stars arises from some affection of the eye, as well as the state of the atmosphere. For, says he, in Holland, when the weather is frosty, and the sky very clear, the stars twinkle most manifestly to the naked eye, though not in telescopes; and since he does not suppose there is any great exhalation, or dancing of the vapour, at that time, he questions whether the vivacity of the light, affecting the eye, may not be concerned in the phenomenon.

But this philosopher might have satisfied himself with respect to this hypothesis, by looking at the stars near the zenith, when the light traverses but a small part of the atmosphere, and therefore might be expected to affect the eye most sensibly. For he would have found that they do not twinkle near so much as they do near the horizon, when much more of their light is intercepted by the atmosphere.

Some astronomers have lately endeavoured to explain the twinkling of the fixed stars, by the extreme minuteness of their apparent diameter; so that they suppose the sight of them is intercepted by every mote that floats in the air. To this purpose Dr. Long observes, (Astron. vol. 1, pa. 170) that our air near the earth is so full of various kinds of particles, which are in continual motion, that some one or other of them is perpetually passing between us and any star we look at, which makes us every moment alternately see it and lose sight of it: and this twinkling of the stars, he says, is greatest in those that are nearest the horizon, because they are viewed through a great quantity of thick air, where the intercepting particles are most numerous; whereas stars that are near the zenith do not twinkle so much, because we do not look at them through so much thick air, and therefore the intercepting particles, being fewer, come less frequently before them. With respect to the planets, it is observed that, because they are much nearer to us than the stars, they have a sensible apparent magnitude, so that they are not covered by the small particles floating in the atmosphere, and therefore do not twinkle, but shine with a steady light.

The fallacy of this hypothesis appears from the observation of Mr. Michell, that no object can hide a star from us that is not large enough to exceed the apparent diameter of the star, by the diameter of the pupil of the eye; so that if a star were even a mathematical point, or of no diameter, the interposing object must still be equal in size to the pupil of the eye; and indeed it must be large enough to hide the star from both eyes at the same time.

The principal cause, therefore, of the twinkling of the stars, is now acknowledged to be the unequal refraction of light, in consequence of inequalities and undulations in the atmosphere.

This twinkling must be carefully distinguished from the irradiations of remote luminous objects seen under a small angle; the latter being very different in appearance, and attributable to a very different cause.

Mr. Hassenfratz published an essay on this subject in Ann. de Chim. vol. clxxii. from which the following are the inferences.

1. That the figure of luminous objects within the sphere of distinct vision is perfectly distinguishable.

2. That these figures are altered in proportion as we recede from this; and that at a great distance, when these objects are seen under an angle of one or two minutes, they appear surrounded with several irradiations, two of which are in the direction of the eyelids.

3. That these irradiations are independent of the figure of the luminous object, and are produced by the organ perceiving them.

4. That these irradiations are occasioned chiefly by the irregular figure of the surfaces of the crystalline and cornea.

5. Lastly, that this irradiation is not well distinguished, except in the dark; because, the iris having then a greater opening, the irradiation occasioned by the irregularity of the surfaces of the crystalline and cornea becomes more perceptible.

TWI'NLING. *s.* (diminutive of *twin.*) A twin lamb; a lamb of two brought at a birth (*Tusser*).

TWI'NNER. *s.* (from *twin.*) A breeder of twins (*Tusser*).

To TWIRL. *v. a.* (from *whirl.*) To turn round; to move by a quick rotation (*Bacon*).

To TWIRL. *v. n.* To revolve with a quick motion.

TWIRL. *s.* (from the verb.) 1. Rotation; circular motion. 2. Twist; convolution (*Woodward*).

To TWIST. *v. a.* (ʒeꞇƿıꞅan, Sax. *twisten*, Dutch.) 1. To form by complication; to form by convolution (*Taylor*). 2. To contort; to writhe (*Pope*). 3. To wreath; to wind; to encircle by something round about (*Burnet*). 4. To form; to weave (*Shaks.*). 5. To unite by intertexture of parts (*Waller*). 6. To unite; to insinuate (*Decay of Piety*).

To TWIST. *v. n.* To be contorted; to be convolved (*Pope*).

TWIST. *s.* (from the verb.) 1. Any thing made by convolution, or winding two bodies together (*Addison*). 2. A single string of a cord (*Moxon*). 3. A cord; a string (*Dryden*). 4. Contortion; writhe (*Addison*). 5. The manner of twisting (*Arbuthnot*).

TWI'STER. *s.* (from *twist.*) 1. One who twists; a ropemaker. 2. The instrument of twisting (*Wallis*).

"To this word," says Dr. Johnson, "I have annexed some remarkable lines, which explain *twist* in all its senses.

> "When a *twister* a twisting will twist him a twist,
> For the twisting of his twist he three twines doth intwist;
> But if one of the twines of the twists do untwist,
> The twine that untwisteth untwisteth the twist.
> Untwirling the twine that untwisteth between,
> He twirls with his twister the two in a twine;
> Then twice having twisted the twines of the twine,
> He twiching the twine he had twined in twain.
> The twain that in twining before in the twine
> As twins were intwisted he now doth untwine,
> 'Twixt the twain intertwisting a twine more between,
> He, twirling his *twister*, makes a twist of the twine."

The preceding lines were written by Dr. Wallis, the celebrated mathematician. A certain French gentleman extolling the felicity of his own language, which had words that implied a likeness to the thing signified; at the same time finding fault with the English language as not possessing the same capability, proposed the following to Dr. Wallis by way of challenge.

> "Quand un cordier, cordant, vult corder une corde;
> Pour sa corde corder, trois cordons il accorde;
> Mais si un des cordons de la corde descorde,
> Le cordon descordant fait descorder la corde."

The doctor immediately translated this by the first four of the lines above, employing the purely English word *twist:* and, to show the superior application of the English language, added the other eight lines, as above given.

To TWIT. *v. a.* (eꝺpıꞇan, Saxon.) To sneer; to flout; to reproach (*Tillotson*).

To TWITCH. *v. a.* (ꞇpıccıan, Saxon.) To vellicate; to pluck with a quick motion; to snatch (*Dryden. Pope*).

Twitch. *s.* (from the verb.) 1. Quick pull; a sudden vellication (*Hudibras*). 2. A contraction of the fibres (*Blackmore*).

Twitch, an instrument used by farriers to keep the head of a horse in a particular position whilst he is undergoing any painful or unpleasant operation. It consists merely of a short stick, or roller, to the end of which is affixed a noose of cord, sufficiently wide to admit the animal's upper lip. The noose being twisted by a few turns of the stick in the hand of the groom, the horse is thereby secured from making any resistance.

Twitch grass. See Fiorin.

TWITE, in ornithology. See Fringilla.

To TWI'TTER. *v. n.* 1. To make a sharp tremulous intermitted noise (*Dryden*). 2. To be suddenly moved with any inclination. A low word (*L'Estrange*).

Twi'tter. *s.* 1. Any motion or disorder of passion (*Hudibras*). 2. An upbraider.

TWITTLETWA'TTLE. *s.* Tattle; gabble. A vile word (*L'Estrange*).

'TWIXT. A contraction of *betwixt* (*Milton*).

TWO. *a.* (*twai*, Gothic; ꞇpu, Saxon.) One and one (*Shakspeare*).

Two-capsuled, in botany. See Bicapsular.

Two-celled. See Bilocular.

Two-cleft, or Bifid, in botany. See Cleft.—Utricularia is an instance of the two-cleft perianth.

Two'edged. *a.* (*two* and *edge.*) Having an edge on either side (*Pope*).

Two-edged, or Ancipital. See Ancepital.

Two-faced leaves. See Bifarious.

Two-flowered peduncle. Pedunculus biflorus. Proceeding simple from the stem or branch, but bearing two flowers at the end.

Two'fold. *a.* (*two* and *fold.*) Double; two of the same kind (*Prior*).

Two-fold. *ad.* Doubly (*Matthew*).

Two-fold leaves. Bina folia. Two and two together, from the same place, or at the same joint. See Binate.

Two-forked. See Dichotomous.

Two'handed. *a.* (*two* and *hand.*) Large; bulky; enormous of magnitude (*Dryden*).

Two-horned. See Bicorn.

Two-leaved calyx. Diphyllus. As papaver, fumaria. Applied to the tendril—and to the peduncle in gomphrena.

Two-lipped corol. Bilabiate. As in pinguicula, and most flowers of the didynamia class.

Two-lobed leaf. Bilobum folium. See Lobate.

Two'pence. *s.* A small coin, valued at twice a penny (*Shakspeare*).

Two-pence herb, in botany. See Lysimachia.

Two-parted leaf, or perianth. Bipartitum folium, perianthium. Divided in two down to the base.

Two-petalled corol. Dipetalous. As in circæa, commelina.

Two-ranked, or two-rowed. See Distichous.

Two-seeded fruit. Dispermus fructus. Containing two seeds.—Disperma planta. Having two seeds to each flower: as in umbellate and stellate plants.

Two-valved pericarp. Bivalve pericarpium. As in chelidonium, and all siliques and legumes.—Two-valved glume. Gluma bivalvis: as in the calyx and corol of most grasses.

TYBUR. See Tibur.

TYCHIUS, a celebrated artist of Hyle in Bœotia, who made Hector's shield, which was covered with the hides of seven oxen.

TYDEUS, a son of Œneus, king of Calydon, fled after the accidental murder of one of his friends to the court of Adrastus, king of Argos, whose daughter Deiphyle he married. When Adrastus wished to replace his son-in-law Polynices on the throne of Thebes, Tydeus undertook to declare war against Eteocles, who usurped the crown. The reception he met provoked his resentment; he challenged Eteocles and his officers to single combat, and defeated them. On his return to Argos, he slew 50 of the Thebans who had lain in ambush to surprise him; and only one was permitted to return to Thebes, to bear the tidings of the fate of his companions. He was one of the seven chiefs of the army of Adrastus, and during the Theban war he behaved with great courage, but was at last wounded by Menalippus, whom he notwithstanding slew on the spot. The savage barbarity of Tydeus, exercised on the dead body of Menalippus, displeased Minerva, who was coming to make him immortal; the goddess left him to his fate, and suffered him to die. He was father to Diomedes.

TYE. *s.* See Tie. A knot; a bond or obligation (*Pope*).

TY'GER. *s.* See Tiger, and Felis.

TYKE. *s.* See Tike. A dog, or one as contemptible and vile as a dog (*Shakspeare*).

TYLOSIS. (τυλωσις, from τυλος; a callous.) An induration or callous of the margin of the eyelids.

TYMPAN, among printers, a double frame belonging to the press, covered with parchment, on which the blank sheets are laid in order to be printed off. See Printing.

TYMPANI MEMBRANA. See Membrana tympani.

TYMPANIS, in botany, a genus of the class cryptogamia, order fungi. Fungus cup-shaped; the cupola volvate above; seeds dry, mouldering to powder. One species only, tympanis saligna, an exotic.

TYMPANITES (τυμπανιτης, from τυμπανον, a drum; so called because the belly is distended with wind, and sounds like a drum when struck.) Tympany, an elastic distention of the abdomen not readily yielding to pressure, and sounding like a drum, with costiveness and atrophy, but no fluctuation. Species: 1 Tympanites intestinalis, a lodgment of wind in the intestines, known by the discharge of wind giving relief. 2 Tympanites abdominalis, when the wind is in the cavity of the abdomen.

TYMPANUM. (τυμπανον.) The drum or barrel of the ear. The hollow part of the ear in which are lodged the bones of the ear. It begins behind the membrane of the tympanum, which terminates the external auditory passage, and is surrounded by the petrous portion of the temporal bone. It terminates at the cochlea of the labyrinth, and has opening into it four foramina, viz. the orifice of the Eustachian tube and mastoid sinus, the finestra ovalis, and rotunda. It contains the four ossicula auditus.

Tmpanum, or Tympan, in mechanics, a kind of wheel placed round an axis, or cylindrical beam, on the top of which are two levers or fixed staves, for the more easy turning the axis, in order to raise a weight required. The tympanum is much the same with the peritrochium, but that the cylinder of the axis of the peritrochium is much shorter, and less than the cylinder of the tympanum.

Tympanum of a machine, is also used for a hollow wheel, wherein one or more people, or other animals, walk to turn it; such as that of some cranes, calenders, &c.

TYNDALE (William), a zealous English reformer, and memorable for having made the first English version of the Bible, was born on the borders of Wales some time before 1500. He was of Magdalene-hall in Oxford, where he distinguished himself by imbibing early the doctrines of Luther, and by as zealously propagating those doctrines among others. Afterwards he removed to Cambridge, and from thence went to live with a gentleman in Gloucestershire in the capacity of tutor to his children.—While he continued there, he showed himself so furious for Luther, and so inveterate to the pope, that he was forced, merely for the security of his person, to leave the place. He next endeavoured to get into the service of Tonstall, bishop of Durham, but did not succeed. His zeal for Lutheranism made him desirous to translate the New Testament into English; and as this could not safely be done in England, he went into Germany, where, setting about the work, he finished it in 1527. He then began with the Old Testament, and finished the five books of Moses, prefixing discourses to each book, as he had done to those of the New Testament. At his first going over into Germany, he went into Saxony, and had much conference with Luther; and then returning to the Netherlands, made his abode chiefly at Antwerp. During his peregrinations from one country to another, he suffered shipwreck upon the coast of Holland, and lost all his books and papers. His translations of the Scriptures being in the mean time sent to England, made a great noise there; and in the opinion of the clergy, did so much mischief, that a royal proclamation was issued out, prohibiting the buying or reading such translation or translations. But the clergy were not satisfied with this; they knew Tyndale capable of doing infinite harm, and therefore thought of nothing less than removing him out of the way. For this purpose one Philips was sent over to Antwerp, who insinuated himself into his company, and under the pretext of friendship betrayed him into custody. He was sent to the castle of Filford, about 18 miles from Antwerp, and though the English merchants at Antwerp did what they could to procure his release, and letters were also sent from lord Cromwell and others out of England, yet Philips bestirred himself so heartily, that he was tried and condemned to die. He was first strangled by the hands of the common hangman, and then burned near Filford castle, in 1536. While he was tying to the stake, he cried with a fervent and loud voice, "Lord, open the king of England's eyes."

TYNE, a river in Northumberland, formed of a branch from the county of Durham, and another from the hills on the borders of Scotland. These uniting a little above Hexham, form a large river, which flows to Newcastle, and enters the German ocean, at Tinmouth.

Tyne, a river, which rises in the mountains in the south of Haddingtonshire, waters Haddington, and enters the German ocean to the west of Dunbar.

TYNEMOUTH. See Tinmouth.

TYPE (τυπος), an impression, image, or representation of some model, which is termed the antitype. In this sense the word occurs often in the writings of divines, who employ it to denote that prefiguration of the great events of man's redemption which they have found or fancied in the principal transactions recorded in the Old Testament.

That the death of Christ for the sins of men, and his resurrection from the dead for their justification, were prefigured in the ritual worship instituted by Moses, is indeed incontrovertible; but when divines consider as a type every thing mentioned in the Hebrew scriptures, in which an active imagination can discover the slightest resemblance or analogy to any circumstance in the life, or death, or resurrection of Christ, they expose the whole doctrine of types to the ridicule of unbelievers, and do a real injury to that cause which it is their professed intention to serve. To contend, as some of them have done, that the extraction of Eve from the side of Adam, while he was in a deep sleep, was intended as a type of the Roman soldier's piercing our Saviour's side while he slept the sleep of death; or that the envy of the sons of Jacob to their brother Joseph, was typical of the envy of the Scribes and Pharisees to Jesus the Messiah, is to burlesque the Scriptures, and insult reason.

Type, in printing. See Letter, Letter-founding, Printing, &c.

Mr. Elitree White took out in 1806 a patent for a machine for casting types. The following is an abridged description of it.

This machine is composed of a number of small pieces of metal of the same breadth and depth as the types wanted, so placed in a strong metallic frame, that every second piece can be drawn between the others, so as to leave a vacant space equal in its dimensions to the type required.

The metallic frame consists of a sliding part, and a fixed part; the sliding part is formed so as to move very truly and steadily; and is drawn forwards and backwards by a strong screw attached to its centre, which is turned by a winch.

Of the small metallic pieces every second one is attached to the sliding part of the frame, and the others, lie between them; the first are called female sliders, and the latter male sliders.

The male sliders are an inch shorter than the others, and have each a stud or pin projecting from it, half an inch in height, which serves to regulate the extent to which it can be drawn backwards; a grooved bar is fastened across the fixed part of the frame, which stops the studs; and the degree of their distance from the part of the frame opposite to their other ends, is regulated by screws fixed in this bar before each of the studs. By this arrangement when the female slides are moved forwards, the male slides move with them till they are stopped by their studs coming against the bar, after which the ends of the female sliders proceed on beyond them to the end of the fixed frame, and thus form the vacant spaces before-mentioned, which are then equal to the distance that the female slides have moved beyond the males.

A bar perforated by a groove, which forms a sort of trough, is placed beneath the cavities thus formed: this is called the matrix bar, and is moveable on hinges or pivots, in such a manner that it can be removed at pleasure to take out the types. Into the groove of the matrix bar is fitted a metallic box, or long cell, capable of holding as many matrixes as the machine will form letters at a single cast; the matrixes may be fastened in the box either by screws, wedges, or other means; and when the types are to be cast, the matrix box is pressed up against the sliders, and will then bring the matrixes exactly opposite the vacant spaces between the sliders.

A trough formed of two pieces is placed above the cavities, to convey the melted type metal to them; one half of this trough is attached to the fixed part of the frame, the other to the sliding part; so that when this last part is moved forward, the trough is completed by its parts coming in contact; but when it is drawn back the trough separates; and at the same time the female sliders are drawn within the male's, which leaves the newly-cast types quite clear of all the sliders, so that they easily drop out.

Observations.—This machine seems strong, steady, and well contrived for its purpose. The screw, besides moving the sliding part forwards and backwards, as mentioned by the patentee, serves also to compress the ends of the female sliders sufficiently tight against the fixed frame, to prevent the fluid metal from running out. Though the friction of the slides against each other must ultimately damage them, yet if well made they will last a long time, and may be easily replaced when worn out. (*Retrospect, No.* 10).

To Type. *v. a.* To prefigure (*White*).

TYPHA. Cat's tail. Reed-mace. In botany, a genus of the class monœcia, order triandria. Male: ament cylindrical, hairy; anthers about three on each filament. Fem: ament cylindrical; seed one, on a feathered pedicel. Three species; all natives of our own country.

1. T. latifolia. Broad-leaved cat's tail. Leaves somewhat sword-shaped: male and female spikes near together. Found in ponds.

2. T. angustifolia. Narrow-leaved cat's tail. Leaves semi-cylindrico, flattish, as long as the stalk: male and female spikes remote; leafless. Found also in ponds.

3. T. minor. Lesser cat's tail. Leaves linear, convex underneath, spike interrupted: male leafy. Found in marshes.

TYPHŒUS, or Typhon, a famous giant, son of Tartarus and Terra, who had a hundred heads like those of a serpent or a dragon. Flames of devouring fire were darted from his mouth and eyes. He was no sooner born than he made war against heaven, and so frightened the gods, that they fled and assumed different shapes. Jupiter became a ram, Mercury an ibis, Apollo a crow, Juno a cow, Bacchus a goat, Diana a cat, Venus a fish, &c. The father of the gods at last put Typhœus to flight, and crushed him under mount Ætna. Typhœus became father of Geryon, Cerberus, and Orthos, by his union with Echidna. (*Ovid. Homer. Virgil*).

TYPHON, a giant whom Juno produced by striking the earth. Some of the poets make him the famous Typhœus. (See Typhœus.)—A brother of Osiris, who laid snares for his brother during his expedition, and murdered him. (See Osiris.) He was reckoned, among the Egyptians, to be the cause of every evil, and on that account he was represented as a wolf and a crocodile.

TYPHUS. (from τυφος, stupor.) A species of continued fever. See Febris continua.

Typhus putridus. This fever takes its name from the malignancy of its nature, and the evident symptoms of putrefaction which are to be observed when it has been of any continuance. It is to be readily distinguished from the inflammatory, by the smallness of the pulse, and the sudden and great debility which ensues on its first attack; and, in its more advanced stage, by the petechiæ, or purple spots which come out on various parts of the body, and the fetid stools which are discharged; and it may be distinguished from a nervous fever by the great violence of all the symptoms on its first coming on.

The most general cause that gives rise to this disease is contagion, applied either immediately from the body of a person labouring under it, or conveyed in clothes or merchandise, &c.; but it may be occasioned by the effluvia arising from either animal or vegetable substances in a decayed or putrid state; and hence it is, that in low and marshy countries it is apt to be prevalent when intense and sultry heat quickly succeeds any great inundation. A want of proper cleanliness, and confined air, are likewise causes of this fever; hence it prevails in hospitals, gaols, camps, and on board of ships, especially when such places are much crowded, and the strictest attention is not paid to a free ventilation and due cleanliness. A close state of the atmosphere, with damp weather, is likewise apt to give rise to putrid fever. Those of lax fibres, and who have been weakened by any previous debilitating cause, such as poor diet, long fasting, hard labour, continued want of sleep, &c. are most liable to it.

On the first coming on of the disease, the person is seized with languor; dejection of spirits; amazing depression and loss of muscular strength; universal weariness and soreness; pains in the head, back, and extremities, and rigours; the eyes appear full, heavy, yellowish, and often a little inflamed; the temporal arteries throb violently; the tongue is dry and parched; respiration is commonly laborious, and interrupted with deep sighing; the breath is hot and offensive; the urine is crude and pale; the body is costive; and the pulse is usually quick, small, and hard, and now and then fluttering and unequal. Sometimes a great heat, load, and pain, are felt at the pit of the stomach, and a vomiting of bilious matter ensues.

As the disease advances the pulse increases in frequency (beating often from 100 to 130 in a minute); there is vast debility; great heat and dryness in the skin; oppression at the breast, with anxiety, sighing, and moaning; the thirst is greatly increased; the tongue, mouth, lips, and teeth, are covered over with a brown or black tenacious fur; the speech is inarticulate, and scarcely intelligible; the patient mutters much, and delirium ensues. The fever continuing to increase still more in violence, symptoms of putrefaction shew themselves; the breath becomes highly offensive; the urine deposits a black and fetid sediment; the stools are dark, offensive, and pass off insensibly; hæmorrhages issue from the gums, nostrils, mouth, and other parts of the body; livid spots or petechiæ appear on its surface; the pulse intermits and sinks; the extremities grow cold; hiccups ensue; and death at last closes the tragic scene.

When this fever does not terminate fatally, it generally begins in cold climates to diminish about the commencement of the third week, and goes off gradually towards the end of the fourth, without any very evident crisis; but in warm climates it seldom continues above a week or ten days, if so long.

Our opinion as to the event is to be formed by the degree of violence in the symptoms, particularly after the appearance of petechiæ, although in some instances recoveries have been effected under the most unpromising appearances. An abatement of febrile heat and thirst, a gentle moisture diffused equally over the whole surface of the body; loose stools, turbid urine, rising of the pulse, and the absence of delirium and stupor, may be regarded in a favourable light. On the contrary, petechiæ, with dark, offensive, and involuntary discharges by urine and stool, fetid sweats, hæmorrhages, and hiccups, denote the almost certain dissolution of the patient.

The appearances usually perceived on dissection are inflammations of the brain and viscera, but more particularly of the stomach and intestines, which are now and then found in a gangrenous state. In the muscular fibres there seems likewise a strong tendency to gangrene.

TY'PICAL. Ty'pic. *a.* (*typique*, French; *typicus*, Latin.) Emblematical; figurative of something else (*Atterbury*).

TY'PICALLY. *ad.* (from *typical.*) In a typical manner (*Norris*).

TY'PICALNESS. *s.* (from *typical.*) The state of being typical.

To **TY'PIFY.** *v. a.* (from *type.*) To figure; to show in emblem (*Hammond*).

TYPO'GRAPHER. *s.* (τυπος and γϱαφω.) A printer.

TYPOGRA'PHICAL. *a.* (from *typography.*) 1. Emblematical; figurative. 2. Belonging to the printer's art.

TYPOGRA'PHICALLY. *ad.* 1. Emblematically; figuratively. 2. After the manner of printers.

TYPO'GRAPHY. *s.* (*typographie*, Fr. *typographia*, Latin.) 1. Emblematical, figurative, or hieroglyphical representation (*Bro.*). 2. The art of printing.

TY'RANNESS. *s.* (from *tyrant.*) A she tyrant (*Spenser*).

TYRA'NNICAL. TYRA'NNIC. *a* (*tyrannus*, Latin; τυϱαννικος.) Suiting a tyrant; acting like a tyrant; cruel; despotic; imperious (*Shakspeare. Pope*).

TYRA'NNICALLY. *ad.* (from *tyrannical.*) In manner of a tyrant.

TYRA'NNICIDE, *s.* (*tyrannus* and *cædo*, Latin.) The act of killing a tyrant.

TYRANNION, a grammarian of Pontus, intimate with Cicero. His original name was Theophrastus, and he received that of Tyrannion from his austerity to his pupils. To his care the world is indebted for the preservation of Aristotle's works.

To **TY'RANNISE.** *v. n.* (*tyranniser*, Fr. from *tyrant.*) To play the tyrant; to act with rigour and imperiousness (*Hooker*).

TY'RANNOUS. *a.* (from *tyrant.*) Tyrannical; despotic; arbitrary; severe; cruel; imperious: not in use (*Sidney*).

TY'RANNY. *s.* (*tyrannis*, Latin; τυϱαννις.) 1. Absolute monarchy imperiously administered (*Milton*). 2. Unresisted and cruel power (*Shakspeare*). 3. Cruel government; rigourous command (*Bacon*). 4. Severity; rigour; inclemency (*Shakspeare*).

TY'RANT. *s.* (τυϱαννος; *tyrannus*, Lat.) 1. An absolute monarch governing imperiously. 2. A cruel, despotic, and severe master; an oppressor (*Sidney*).

TYRE. *s.* See TIRE (*Hakewill*).

TYRE, formerly a celebrated city of Asia, on the coast of Syria, situated under the 54th degree of east longitude, and 32d of north latitude. It was built, according to some writers, 2760 years before the Christian era. There were two cities of that name; the one called Palætyrus, situated on the continent; and the other the city of Tyre, built on an island about half a mile from the shore. It was about 19 miles in circumference, including Palætyrus; the town on the island was about four miles round. The buildings of Tyre were very magnificent; the walls were 150 feet high, and broad in proportion. This city was at one period the most famous commercial city in the world. Of its commercial transactions the most particular account that is to be found in any ancient writer has been given by the prophet Ezekiel, which at the same time conveys a magnificent idea of the extensive power of that state. It resisted Nebuchadnezzar, king of Babylon, for 13 years; at the end of which, wearied with endless efforts, the inhabitants resolved to place the sea between them and their enemy, and passed accordingly into the island. The new city stood out against Alexander the Great for seven months; and before he could take it, he was obliged to fill up the strait which separated the island from the continent. It was repaired afterwards by Adrian, and became the metropolis of the province. It afterwards fell into the hands of the Arabs; and after being taken by Baldwin II. king of Jerusalem, it was destroyed by the sultan of Egypt in 1289, and abandoned, never more to rise from its ruins. An excellent account of its situation and modern state may be found in Volney's Travels, vol. ii. It now consists of a small village, composed of wretched huts, containing about fifty or sixty poor families. The words of Ezekiel are literally fulfilled, "And they shall make a sport of their riches." (Ezek. xxvi. 12, 13, 14.) Mr. Bruce saw this queen of the nations converted into a place for fishers to dry their nets in. Its harbour, formerly so famous for its shipping, is now almost choked up. It is called *Sour* or *Tsour* by the Orientals.

TYRIAN PURPLE. The splendid and durable dye imported by this name has been for ages known to the learned world, though there has been long a controversy concerning the shellfish from which it was first, and perhaps usually obtained. By successive naturalists it has commonly been described by the name of murex, but in a different meaning from the term as appropriated in the present day. The Greeks called it κογχυλη (*conchylè*), probably from the turbinated form of the shell, in this respect resembling the modern murex; and it is distinguished by a similar name by Lucretius, Rer. Nat. VI. 1072.

Purpureusque colos conchylii jungitur uno
Corpore cum lanæ, dirimi qui non queat usquam;
Non—si Neptunis fluctu renovare operam des;
Non---mare si totum velit eluere omnibus undis.

————With the fleece
The purple murex so minutely blends
Nought e'er can part them; no---though e'en thou toil
Day after day with all great Neptune's waves;
No---his whole sea the stain would ne'er wash out.
GOOD.

The origin of this famous discovery is perhaps unknown. Tradition has handed down to us different accounts of it. It is said that a shepherd's dog, being pressed with hunger, broke a shell upon the sea-shore, when the fluid that oozed from it stained his mouth of so beautiful a colour, as to strike the admiration of those who saw it; in consequence of which they endeavoured to make a dye of it, and succeeded. Another account is, that at the time Hercules was in love with the nymph Tyros, his dog happening to find a shell on the sea-shore, broke it, and stained his mouth with the splendid purple. The nymph observing it, and charmed with the richness and beauty of the colour, declared to her lover that she would see him no more till he brought her a garment dyed with the purple. Hercules succeeded, by collecting a number of shells, and brought the purple robe she had demanded.

Some chronologists place this discovery in the reign of Phœnix, second king of Tyre, about five centuries before Christ; others in the reign of Minos the first, king of Crete, about 1439 years before the Christian era. The greater number of authors, however, give the honour of the invention of dyeing stuffs purple to the Tyrian Hercules. He gave his first efforts to the king of Phœnicia, who became so jealous of the beauty of the dye, that he forbade its use to all but his descendants, and the presumptive heir of the crown.

In process of time, however, it appears obvious that the purple dye was obtained from various kinds of shell-worms, or shell-fishes; though the best were still traced near the isle on which New Tyre was founded. They were fished for, however, in other places on the Mediterranean. The coasts of Africa were famous for the purple of Getulia, while those of Europe supplied that of Laconia, both of which also were held in high esteem.

According to Aristotle and Pliny, to whom we are indebted for almost the only rational account that has reached us, the proper shell-fish was an univalve. The latter writer, in whose time, it seems, this dye had obtained its greatest perfection, divides the purple shell-fish into two species; the first, constituting the smallest species, he calls buccinum or whelk; the second he denominates purpura, and describes as of a larger size. Both species were subdivided into several varieties; they were likewise distinguished by the more or less beautiful colour they gave, and according to the coasts where the fishery was carried on. These are supposed by Fabius Columna to have been also distinguished by the generic name of murex.

The juice was contained in a small vein found in the body of the buccinum, quite colourless; it likewise, when broken, contained a very small quantity of a red liquor shaded with a black tinge, the nigricans rosa of Pliny. The colouring juice of the purpura was found in a vessel in the throat, but so small was it in quantity that only one drop could be extracted from each animal.

When a sufficient quantity of the colouring juice was extracted, a certain portion of marine salt was added to it; it was then macerated for three days, after which five times the quantity of water was added, the mixture kept in a moderate heat, and the animal parts which rose to the surface were separated from time to time. These operations lasted ten days; after which the liquor was tried whether it had taken the proper degree of colour, by means of a piece of white wool. Previous to the dyeing the stuff was differently prepared. Some dipped in lime-water; others made use of a species of succus, which acted as a mordant, to render the colour more fixed. We are informed that the liquor of the buccinum did not afford a fixed colour of itself, but increased the brightness of the colour of the purpura.

In dyeing the Tyrian purple, they began with the juice of the purpura, then a second dye was given with that of the buccinum; hence Pliny gives it the name of purpura dibotha. In other processes the juice of the two were mixed; for instance, to dye 50lb. of wool, 200lb. of the buccinum and 100lb. of the juice of the purpura were taken; by which means an amethyst colour was obtained. Sometimes a ground was given with the coccus (the modern kermes), and afterwards the juice of the purpura was used. Likewise a great variety of purples were obtained by uniting some of these methods, which were distinguished by different names; thus, according to Pliny, that of Tyre was of the colour of coagulated blood; the amethyst purple took its name from the stone; another species resembled violet, &c. It appears that some kinds of purples preserved their colour for a long time; for it is related by Plutarch, in the life of Alexander, that the Greeks found a great quantity of purple in the treasury of the king of Persia, the beauty of which had not changed during 190 years.

The very small quantity of juice extracted from these animals, and the length of the operation of dyeing, made the purple of so high a price that, at the time of Augustus, one pound of wool dyed with the Tyrian purple could not be bought for thirty pounds. It is supposed, from the commerce of this precious dye, that it contributed much to the opulence of that once celebrated city. From its great price it was, as may be supposed, an attribute every where of high birth and dignities. The purple therefore decorated the magistrates of Rome; but as it soon became less scarce amongst the opulent, it was reserved, under pain of death, to the emperors; whilst the priests, every where busy, canonized it as a colour agreeable to the divinity; and which, when first known, was arrogated by them for his worship.

For many centuries nothing was known respecting the two juices which formed the Tyrian dye, except what the ancients had left us; so that although Aristotle and Pliny had given some intimations of their being primitively white, and Pliny had mentioned one of the intermediate colours, a green, which takes place, yet the other colours they undergo on exposure to the rays of the sun were not distinctly noticed, until the animals which afford them were discovered at the end of the last century, and the beginning of the present. It was not till then that any adequate conceptions could be formed of the changes they underwent before they became purple. For the identity of the shell-fish of the ancients with those of the moderns, we are indebted to Duhamel, who discovered the purpura, and to Cole and Reaumur, who found the buccinum.

With respect to the buccinum, it was found in 1686 by Cole, in great plenty on some of the Irish shores, on the shores of Somersetshire, and the opposite ones of South Wales; and considerable profit was made of it by marking linen with its juice of a fine durable crimson colour. A small species of the buccinum was likewise found by Jussieu, on that part of the French coast which is washed by the Atlantic; it resembled in form the garden-snail, and was presented to the Royal Academy at Paris, in 1709; whilst, in the following year, Reaumur found great quantities on the coast of Poitou. The shell of the buccinum, which is considerably hard, is first broken with a small blow, taking care not to crush the body of the fish within. After picking off the broken pieces, Cole found the juice in a little white vein or reservoir, lying transversely in a small furrow or cleft near the head of the fish. This white liquor being taken out is clammy; and if characters be drawn with it, or if its viscid juice be squeezed upon linen or silk, the part acquires immediately, on being exposed to the sun, a pale yellowish green, then changes to a blue, and, lastly, to a deep purple red. This succession comes on so quickly as scarcely to be distinguished; and the changes are made quicker or slower, according to the degree of the sun's heat.

If the cloth be now washed with scalding water and soap, and laid again in the rays of the sun, the colour changes to a beautiful crimson; which suffers no further alteration from sun or air, or any of the substances used for assaying the permanency of colours. Cole likewise found that whilst linen marked with this white liquor was drying by exposure to the sun, during the first time it always yielded a very strong fetid smell, resembling a mixture of garlic and assafœtida; it appears also that the purple of the ancients had a strong smell.

With respect to the purpura, we are informed by Duhamel that its juice receives no colour, nor communicates any, either to silk or linen, without exposure to the sun; that it is the light, and not the heat, of its rays, that calls its colour forth; for when the silk or linen is covered with thin opaque bodies, which transmit heat without light, no colour is produced, whilst transparent bodies do not impede it. Likewise the light of a culinary fire, concentrated by convex glasses and concave mirrors, has no effect upon it.

Duhamel, who found the rescid colouring liquor of this fish white, except in a few instances, where it was green, and which he supposed originated from disease, gives the colours it assumed on exposure to the sun in the following order: 1. A pale green or yellow. 2. An emerald green. 3. A dark blueish green. 4. A blue, with an incipient redness. 5. A purple. These colours took place in less than five minutes; and it only became green when not exposed to the light. According to Lewis, this succession of colours is best observed when the sun is low, and his action is weak; whilst at noon, in summer, they are so quick as not to be easily distinguished. Duhamel found it in great abundance on the coasts of Provence. Snails possessing the same property are found to exist in various parts of the world. From the account of John Niewhoff, there are abundance of purple snails found in the islands over against Batavia; and it appears that the Chinese have the custom of eating them; at the same time they pick out of the middle of the animal a purple-coloured substance, which they use as red ink. According to Dr. Peysonnel, a naked snail, producing a purple colour, is found in the seas of the Antilles; and is looked upon as precious for the beautiful purple it produces, which is purple without the aid of light. It is emitted in the same manner as the black ink of the cuttle-fish or sepia, which, when in danger, surrounds itself with its rescid, bitter, black fluid: this last was used as ink by the Romans, and is said at this time to form the basis of the Chinese or Indian ink.

In the History of Jamaica, by Dr. Brown, is a description of two shell-fish, containing a similar purple colouring liquor. The one is termed the larger dark lernea or sea-snail, and is very frequent in the American seas. On touching this animal, he observes, it emits a considerable quantity of a viscid purple liquor, which thickens and colours the water so much, that it is scarcely to be seen for some time; by which means, like the cuttle-fish, it escapes danger. This liquor colours linen of a beautiful dark purple, not apt to be changed, either by acids or alkali; but it differs from that of the buccinum by being readily washed out, as well as being naturally emitted of a purple colour. The other of these shell-fish is called the purple ocean-shell, and on being touched it emits a liquor resembling the former.

To these it may be added, on the authority of Reaumur, that on some of the French coasts he found great numbers of small, elliptical, spheroidal bodies, adhering to the rocks by a short stem, like fruits; and that the purple-fish commonly accumulated plentifully about these. On examination of the bodies, he found them to be vesicles filled with a liquor of the same quality as the juice of the fish, but less viscid, and more readily spreading upon linen. At first he suspected them to be eggs, perhaps of the purple-fish; but could not observe any thing like them on dissection. They are only in perfection in autumn; whilst in summer they have either lost their colouring juice, or the juice its power of becoming purple in the sun. And Gage relates, that some shell-fish were found near Nicoya, a small Spanish city in South America, which had all the properties described by the ancients, as Pliny, &c. It even appears that some use is made of them in dyeing cotton on the coasts of Guajaquil and Guatimala.

The colours of the Portuguese men of war, or holuthuria physalis of Linnéus, present, some of them, a beautiful crimson, others a fine purple; and Dr. Bancroft procured a fluid of the same purple colour, with which he stained the corner of a cambric handkerchief that sustained nine months repeatedly washing without losing much of its colour. This liquor was very acid.

It is observed by Martin Lister, in the Philosophical Transactions, that the common hawthorn caterpillar will strike with lie a purple or carnation colour that will stand; likewise the heads of beetles and pismires will give an equally fixed carnation colour; and he adds, that the amber-coloured scolopendra affords, by means of lie, a most beautiful amethyst colour, equally durable: whilst eggs of a cimex, bruised upon white paper, communicate alone a lively and bright vermilion colour.

It appears from these observations that the mode of obtaining Tyrian purple, and similar dyes, is not lost; and that if it has not been attended to in modern times, it is only because colours still more beautiful have been obtained with less expence, and in greater abundance. We shall close with pointing out to those who are desirous of pursuing the subject further, that there is a very free and detailed description of the manner in which the ancients fished for the murex or purpura, in a work composed by Eudosia Macrembolitissa, daughter of the emperor Constantine the eighth, who flourished in the eleventh century, and was an eye-witness of the facts she describes.

TYRO, a beautiful nymph, daughter of Salmoneus, king of Elis and Alcidice. She was treated with severity by her mother-in-law, Sidero, and at last removed from her father's house by her uncle Cretheus. She became enamoured of the Enipeus; and, as she often walked on the banks of the river, Neptune assumed the shape of her lover, and gained her affections. She had two sons, Pelias and Neleus, by Neptune, whom she exposed, to conceal her incontinence from the world. The children were preserved by shepherds, and when they had arrived to years of maturity, they avenged their mother's injuries by assassinating the cruel Sidero. Some time after her amour with Neptune, Tyro married her uncle Cretheus, by whom she had Amythaon, Pheres, and Æson. Tyro is often called Salmonis, from her father.

Ty′ro. *s.* (properly *tiro*, as in the Latin.) One yet not master of his art; one in his rudiments (*Garth*).

TYRONE, a county of Ireland, in the province of Ulster, 46 miles long, and 37 broad; bounded on the N. by Londonderry, E. by Armagh and Lough Neagh, S.W. by Fermanagh, and W. by Donegal. It is divided into 35 parishes, contains about 28,700 inhabitants, and sends three members to parliament. It is a rough country, but tolerably fertile. The capital is Dungannon.

TYRTÆUS, a Greek elegiac poet, born in Attica. In the second Messenian war, the Lacedæmonians were directed by the oracle to apply to the Athenians for a general, if they wished to finish their expedition with success, and they received Tyrtæus. The poet, though ridiculed for his many deformities, animated the Lacedæmonians at the siege of Ithome, and inspired them with so much courage, that they defeated the Messenians. For his services he was made a citizen of Lacedæmon. Of the compositions of Tyrtæus, nothing is extant but a few fragments. He flourished about 684 B. C.

TYRWHITT (Thomas), a learned critic, was born in 1730, and educated at Eton, from whence he went to Queen's college, Oxford. In 1755 he was elected fellow of Merton college, and next year was made under secretary of war to lord Barrington. In 1761 he succeeded Jeremiah Dyson, as principal clerk of the House of Commons, which he resigned to Mr. Hatsell. He gave an excellent edition of the Poetics of Aristotle; but much of his reputation is owing to an admirable edition of Chaucer, which he gave the world: he proved himself an able commentator of Shakspeare, and distinguished himself greatly in the Chattertonian dispute. He died in 1786.

TYSON (Edward), of Bristol, was educated at Magdalen hall, Oxford. He settled in London, and acquired a very extensive practice. He became physician to Bethlehem and Bridewell hospitals, and died very suddenly, 1708, aged 58. His works are Phocæna, or Anatomy of a Porpoise, 4to.—Ephemeri Vita, or the Natural History of the Ephemeron, 4to. Ourang Outang, or Comparison of the Anatomy of the Pigmy, the Ape, the Monkey, and Man, &c. 4to.

TYSTED, a town of Denmark, in North Jutland, with a citadel; seated on the gulf of Lymford, 46 miles west of Alburg. Lon. 8. 25 E. Lat. 56. 54 N.

TYTLER (William), an excellent Scottish writer, was born at Edinburgh in 1711, he was editor of The Poetical Remains of James I. to which a curious and elaborate dissertation is prefixed, forming an important part of the literary history of Europe. He wrote also, among other things, an able vindication of Mary, queen of Scots: he died in a very advanced age.

TZETZES (John), a great grammarian of Constantinople, who flourished in the 12th century: he was accomplished in the whole circle of sciences, and master of the Greek and Hebrew tongues: he wrote Commentaries upon Lycophrius Alexandria, as also Chiliades, which Fabricius calls his most deserving work.

END OF VOL XI. PART I.

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